THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS REVIEW, COPPER AND BRASS
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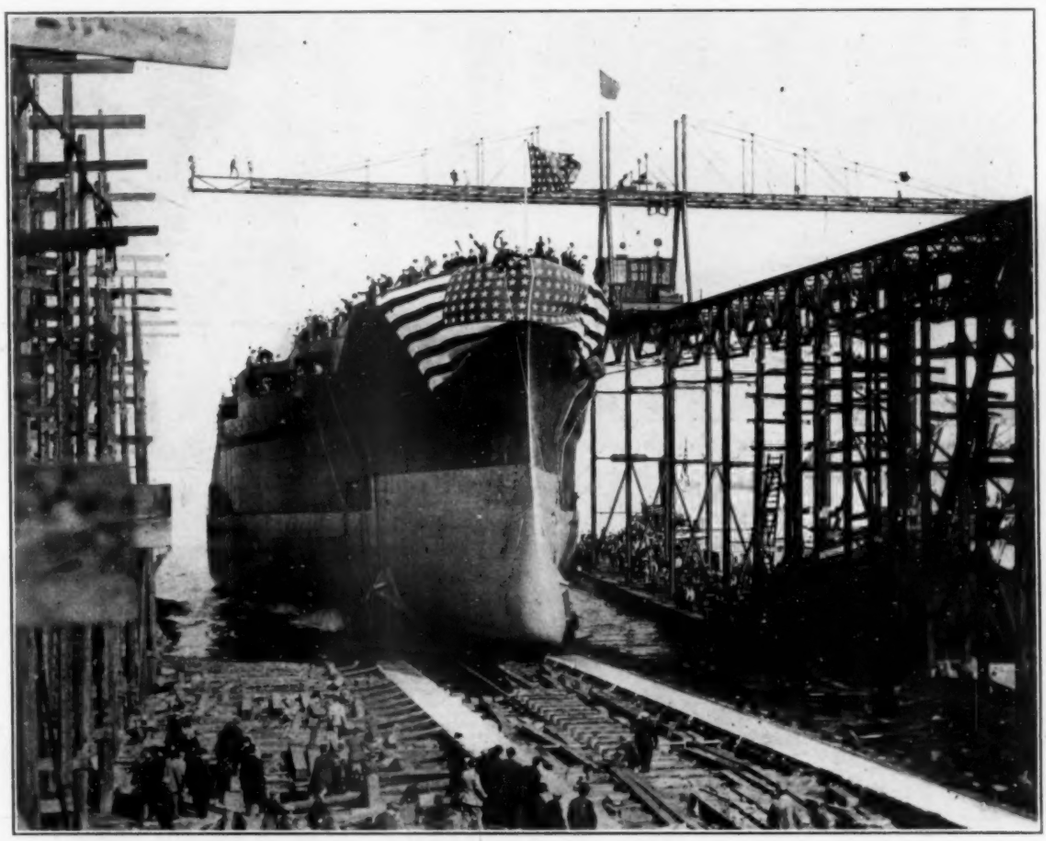
METAL WORK OF THE NEW YORK

A Short Description of the Newest and Largest of the Modern Battleships.

The battleship New York that was launched at the Brooklyn Navy Yard on October 30, 1912, is the largest ship yet built in a Government yard and is the first ship of the United States Navy to carry 14-inch guns. The New York and her sister ship the Texas, built at Newport News, are 573 feet in length over all and of 27,000 tons displacement and carry a battery of ten 45 calibre 14-inch guns in two five-gun turrets.



THE LAUNCHING OF THE NEW YORK AT THE BROOKLYN NAVY YARD, OCTOBER 30, 1912.

The keel of the New York was laid September 11, 1911, and since that time over ten thousand tons of material went into the ship. The New York has been built under the immediate supervision of Naval Constructor John E. Bailey and at this writing she is 80 per cent. completed, her contract date for completion being May, 1914. Some of the interesting facts regarding the New York are: Length, 573 feet; beam, 95 feet 2½ inches; mean draft, 28 feet 6 inches; displacement, 27,000 tons; speed, 21 knots per hour; coal, 2,850 tons; oil, 380 tons; armor belt, 12 inches; gun positions, 12 inches; armament, ten 14-inch guns and twenty-one 5-inch guns; torpedoes, four 21-inch; complement, 1,070 officers and men.

The propelling power of the New York is by means of vertical triple-expansion engines, two in number, which have an indicated horsepower of 15,000 each. The engines are shown in the photographs, Fig. 1 at

an early stage of erection and Fig. 2 when completely erected and ready for dismantling to be put into the vessel. The engines weigh 220 tons each. The form of engine to be used in the New York was decided upon before the steam turbine had proved its efficiency and the development of the reduction gear had not

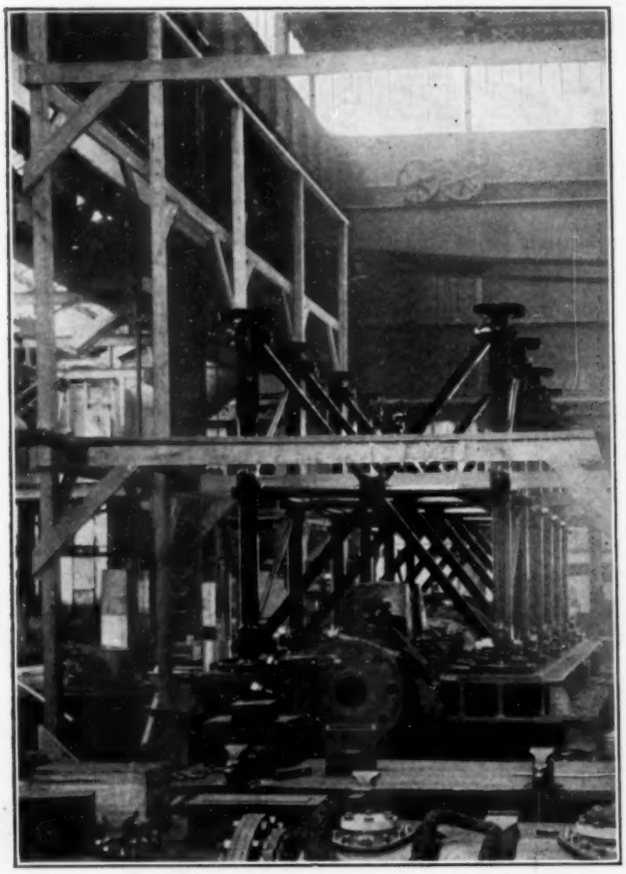


FIG. 1. THE ENGINES OF THE NEW YORK IN CONSTRUCTION.

proceeded far enough to be deemed capable of overcoming the difficulties of the turbine drive. It is entirely possible that no more battleships will be equipped with reciprocating engines. There is a large amount of bronze-brass, composition and anti-friction metal entering into the construction of the New York, but with the exception of the gigantic propeller wheel shown in Fig. 3 all of these parts are small. These consist of liners, valve bodies and connections, journal bearings, bushings, unions and other parts that are specified to be other than iron and steel wherever possible to do so. The propeller wheels, of which there are two, are as shown in Fig 3, built up of a hub and blades and are cast in Government bronze. The wheel is 17 feet in diameter and weighs for the port side, hub 10,544, blade 19,932 pounds, and the starboard side, hub 10,535, blade 19,977 pounds, making a combined weight of bronze for the vessel to carry of 60,988 pounds.

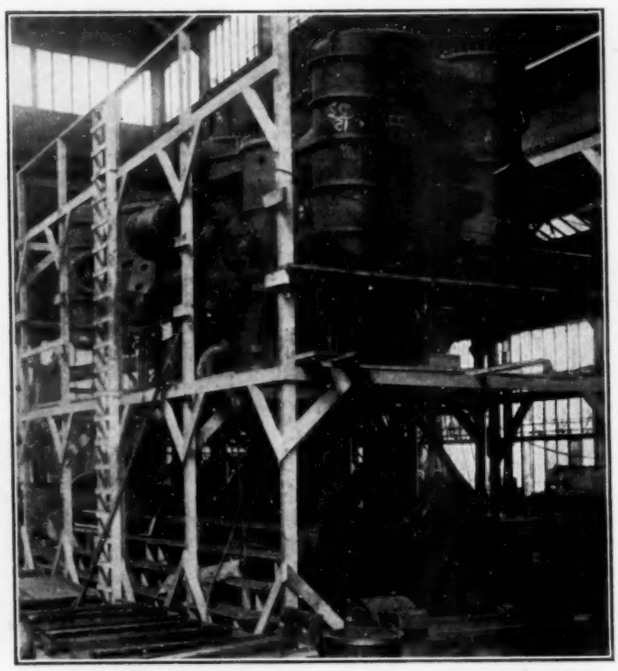


FIG. 2. THE ENGINES OF THE NEW YORK FULLY ASSEMBLED AND READY TO BE INSTALLED IN THE SHIP.

FIG. 3. ONE OF THE PROPELLER WHEELS OF THE NEW YORK. CAST OF BRONZE AT THE PHILADELPHIA NAVY YARD. WEIGHT, 30,000 POUNDS. THE SMALL WHEEL SEEN ON TOP OF THE LARGE ONE IS A 300-POUND PROPELLER FOR A TORPEDO BOAT.

THE REPLATING OF FLAT WARE

AN ARTICLE DEALING WITH JOB SHOP PRACTICE IN REFINISHING KNIVES, FORKS AND SPOONS.

BY EMMANUEL BLASSETT, JR.

To the average plater who lacks experience on flat work the silver plating of knives, forks and spoons is a difficult matter, if he is uninstructed in the details of the process. This article is intended as a guide to the job plater who has had little or no experience in refinishing flat ware. A sort of mystery has been thrown around this branch of electro-plating and when failure confronts the plater there is very little reliable information to serve as a guide in the text books on electro-plating. Silver cyanide solutions work much the same as other cyanide solutions and, generally speaking, the rules that apply to the running of a copper cyanide solution also apply to a silver solution. The employment of from one to three silver "strike" solutions and the statements that are made in regard to the difficulties of making the silver deposit adhere during the process of burnishing has in many instances discouraged the beginner in this branch of the plating business. Any careful workman may easily master the plating of flat ware and the process can hardly be said to be more difficult than other branches of electro-plating. Reliable job platers deposit the required amount of silver on their work and do a satisfactory job without much hand burnishing. The writer has seen flat ware that had not been burnished in use for several years that was still in good condition.

The first step in refinishing steel knives is the polishing operation. If the work is badly pitted it must be polished on at least four wheels to produce a suitable surface for plating. It seldom pays the job plater to strip off the silver; it is more economical to save the sweepings and send them to a refiner. The first polishing should be done on a felt or canvas wheel set up with 120 emery or finer, depending on the condition of the work. The next polishing operation should be done on a felt wheel set up with 150 emery. On this wheel all the marks of the 120 emery should be removed. The work is then run over on a "grease" wheel made from an old 150 emery wheel to which a little oil and emery is applied. A medium grade of emery cake is useful for this purpose. The next operation is "dry fanning" and is done on a wheel set up with the finest flower emery. The best results are produced on a wheel that has been slightly worn down by previous polishing. The easiest way for the job plater to polish steel knives is to work from the back of the wheel in the same manner that a grindstone is used. The wheel should run true and the knife blade drawn across the wheel. In polishing the handle it should be turned slowly while holding the knife by the blade. The bolster of the knife is run over on a sewed buff wheel using tripoli. Most forks and spoons are made of German silver and are much less difficult to polish than steel knives. Usually one wheel set up with 150 emery is sufficient for polishing out the pits on German silver. It may then be finished on a "cutting down" wheel using tripoli. An assortment of small wheels to be used for forks and the bowls of spoons are necessary. This is the most economical way of preparing German silver for plating. If the silver only is worn off in spots and the work is not pitted the "cutting down" wheel alone should be used.

When the work is properly polished it should be washed in benzine or gasolene. Or it may be brushed with potash solution. After removing the grease as far as possible by immersion in the potash solution the work, if made of steel, is carefully brushed with pumice stone. For brushing German silver and brass fine slacked lime should be used. Job platers will find it more convenient to use small copper wire in preference to frames for plating the work. The handles of all flat ware should point downward in the solution and the work wired accordingly. After properly cleaning and wiring the work and previous to plating in the regular bath it is necessary that the work should be struck in a cyanide copper solution, which is the ordinary copper bath made up as follows:

Copper carbonate, 6 ounces; sodium carbonate, 3 ounces; potassium cyanide, ½ pound; water, 1 gallon.

Although copper plating is not absolutely necessary it is well to strike the work in the copper bath, as it helps to clean it and failure is less liable to happen. All job platers have a copper solution so that no extra expense is incurred by this operation. In all cases where the work is made of brass it should first be run in the nickel bath for five or ten minutes, then rinsed in water, run through the cyanide dip and struck up in the regular silver strike. The work should be held in the copper bath just long enough to cover it. It is then rinsed in clean water and struck up in the regular silver strike, made up as follows:

Silver chloride, 1 ounce; potassium cyanide, 2 pounds; water, 1 gallon.

The work is held in the silver strike solution for a fraction of a minute, or until all parts are evenly covered with a rather dull white deposit. It should then be removed without rinsing to the regular plating solution. A practical solution for plating flat ware is composed as follows:

Silver chloride, 3 ounces; potassium cyanide, 1 pound; water, 1 gallon.

In this formula about 3 ounces of potassium cyanide is left in the free state, which is considered to be the right proportion for plating flat ware. The most common trouble to ward against, especially to the job plater, is too much free cyanide in solution. When more than three ounces of free cyanide to a gallon is present the deposit will be hard and brittle and blistering will soon follow. Running the solution steadily with a small anode surface will often bring this condition about. The remedy for a hard or blistered deposit is to add a certain amount of silver chloride, according to conditions. In plating flat ware the current tension should not exceed one volt. For a standard heavy deposit, approximating twelve pennyweight goods, the work should plate for about two hours.

If the work is properly cleaned and struck up in the solutions previously described there is no chance for failure. The deposit will stand burnishing if required. Very little cyanide should be added to the plating bath after it is made up, and if the proper amount of anode surface is present little or no additions of silver chloride are required. By careful management the solution may be run almost entirely from the anode. When water is added to the solution to bring it to the right height a little potassium cyanide may also be introduced. After the work is removed from the plating bath it should be carefully scratch brushed, while wet, using a solution of sodium carbonate or soap tree bark. The work is then colored on a small soft buff wheel. Some fine silver rouge should be applied to the wheel and the work colored with very little pressure. Burnishing the parts of flat ware that come in contact with the table is a very

good practice and is generally done by most job platers. Burnishing should be done previous to coloring on the buff wheel. The average price charged for replating flat ware is as follows:

Table and dessert knives, $3 per dozen; table and dessert forks, $2.50 per dozen; table spoons, $3 per dozen; dessert spoons, $2.50 per dozen; tea spoons, $2 per dozen.

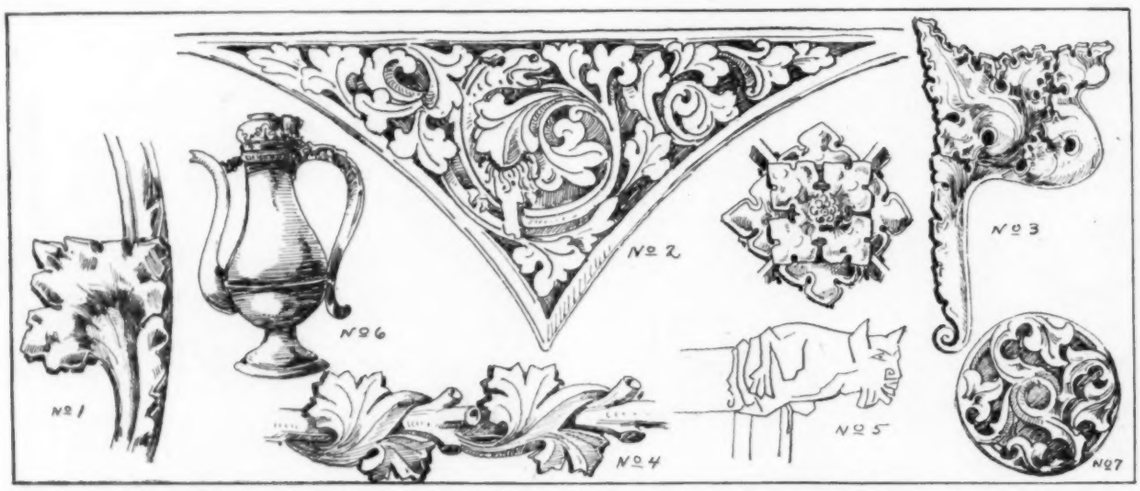
THE INFLUENCE OF STYLE ON THE ART METAL WORK OF MODERN TIMES

THE CONTINUATION OF A SERIES OF ARTICLES ON THIS INTERESTING SUBJECT.

BY A. F. SAUNDERS.*

THE GOTHIC STYLE.

It should be remembered and clearly understood that in making a study of the development of the various styles of ornament, one style did not succeed another in a direct manner, but was brought about by gradual evolution, taking centuries to develop into what could be called a distinct style. A thousand years elapsed between the Classic period and early Oriental and Egyptian; it took another thousand years to develop the Gothic, with the help of the Byzantine and Romanesque from the Classic. The Gothic was essentially characteristic of the Middle Ages, and while primarily a French style (Norman), it also represented an expression of a pure German style, which spread rapidly over England, Italy, Spain and Holland during the twelfth and thirteenth centuries. The



No. 1. Crocket. Warwick Castle. Early English.
No. 2. Wall decoration. From church at Kent. Example of early English Gothic.
No. 3. Crocket. From Rouen Cathedral. 12th century. French Gothic.
No. 4. Moulding. German Gothic.
No. 5. Gargoyle (water spout). From Cathedral Notrè Dame, Paris.
No. 6. Wine tankard. Beaten gilt silver. Reims. French Gothic.
No. 7. Rosette. In Princes House, Coburg Castle. German Gothic. Early period.

Gothic style owes its origin to a desire of the people of the Middle Ages for a freer and more intellectual development of art. It borrowed little from the Classic, and for artistic excellence the work of the architect and the metal craftsman of the early Gothic period has not been equaled until the present century.

In idea, it was symbolic, impulsive, emotional and strongly influenced by religious mysticism. In principle (with the exception of a few degenerate examples in the late period), sound construction ruled, the ornament always in direct subordination to the form. It never overgrew or concealed, but always supplemented and completed the true expression of form in a harmonic manner. In motive, the craftsman was inspired in the creation of both form and decoration by the things around him; the native flora predominated, treated in a naturalistic manner with a slight leaning to conventionalism, though in late Gothic the plant forms became rigid and stiff, producing strong contrasts in light and shade and losing much of their resemblance to the original forms. Art and achitecture were centralized in the cathedral, such beautiful examples as the Abbey of St, Denis, the Notre Dame in Paris, and the cathedrals at Chartres and Rheims, all in the best period of the French Gothic. In England, Westminster Abbey, the Church of Canterbury, and countless churches in Germany and Italy testify to the glories of a new civilization; Gothic was truly a concrete expression of the religious fervor of the times. The gradual development of the difference in expression as developed in the art of the different countries which fell under its influence is worthy of very close study.

From an architectural standpoint the most important single feature of the Gothic style is the pointed arch; it was narrowest and most pointed during the thirteenth century and in direct reaction to the semicircular arch of the Byzantine and Romansque period. The Lanced, or pointed arch, of early English Gothic continued through the Middle or Decorated style, developing finally into what we call the Tudor or ogee arch of the late or Perpendicular period. Thus Gothic is divided into three distinct periods, each developing certain characteristics of its own. As mentioned before in Gothic decorative art, plant life formed the nucleus of all ornament; both floral and leaf forms of infinite variety were utilized in most beautiful and harmonious combinations, chief among which were the Lily, Rose, Bellflower and Acanthus, the Oak, Maple, Meadow Rue, Fig and Parsley. In the selection of plant life symbolic illusions were always taken into account. Figures of men and animals were usually employed in a caricatural manner, truly humor-

*Designer, Benedict Manufacturing Company, East Syracuse, N. Y.

ous; excellent examples of this peculiarity of Gothic art are found in the ornamental detail of the French cathedral of Notre Dame. There is symbolic expression of a wonderful and complex character in the form of man, bird and beast, showing plainly the originality and progress of the people in that age. The church had become a symbol understood, and filled with tokens every soul and eye could comprehend. As "Andrea Cook," in his "Stories in Stone from Notre Dame," expresses it, "The stone cried out from the wall and the beam out of the timber answered it."

These figures are of the most grotesque, yet are tangible signs to express truth. Symbols are boldly thrown together in such a way that the beholder is left to make them out as he may. These Chimeras, as they are called, represented both natural and imaginary forms, such as the wild Boar, the Ape, Elephant, Hog, Cat, the Eagle, Phœnix, Dragon, Griffon, and other monsters. Geometric tracery, such as the Tre-foil (three-sided), the Quatre-foil (four-sided), and the Cinque-foil (five-sided) show a decided Oriental or Eastern influence. The general outline of the style is based on the geometrical principle of symmetry. Late Gothic of the fifteenth century, termed by the French "Flamboyant," due to its lines undulating like flames, was sometimes termed "Florated" because of its extreme richness of floral and leaf ornament. With the beginning of the sixteenth century the first signs of a decline of the Gothic style became evident, especially in England, and a gradual transition from the Tudor or Perpendicular to the early Renaissance, a new style already well developed in Italy, its birth place, and imported into England about that time. The Gothic had never flourished in Italy as it had done in France, Germany or England.

Classic art had too strong a hold on the Italians, it was too much a part of their life. As a consequence, Gothic art in Italy began to decline as early as the middle of the fourteenth century, and showed a decided tendency to turn back to the old Classic; thus the Renaissance (new born) by the beginning of the sixteenth century showed its influence in the decorative art of the entire world. As the development of the three Gothic periods in England went through practically the same course of change, and at the same time as in other countries north of the Alps, a chronological arrangement of these divisions or periods as effected in that country will give one a comprehensive idea of the wonderful development.

From the reign of William to the end of Stephen (1066-1154)—Norman style or Romanesque foundation.

Henry II (1154-1189)—Transition from Norman to Pointed.

Richard I to Henry III (1189-1272)—Early English Gothic Pointed.

II.

Edward I (1272-1307)—Transition from early Pointed to complete Geometrical.

Edward II (1307-1327)—Geometrical Pointed.

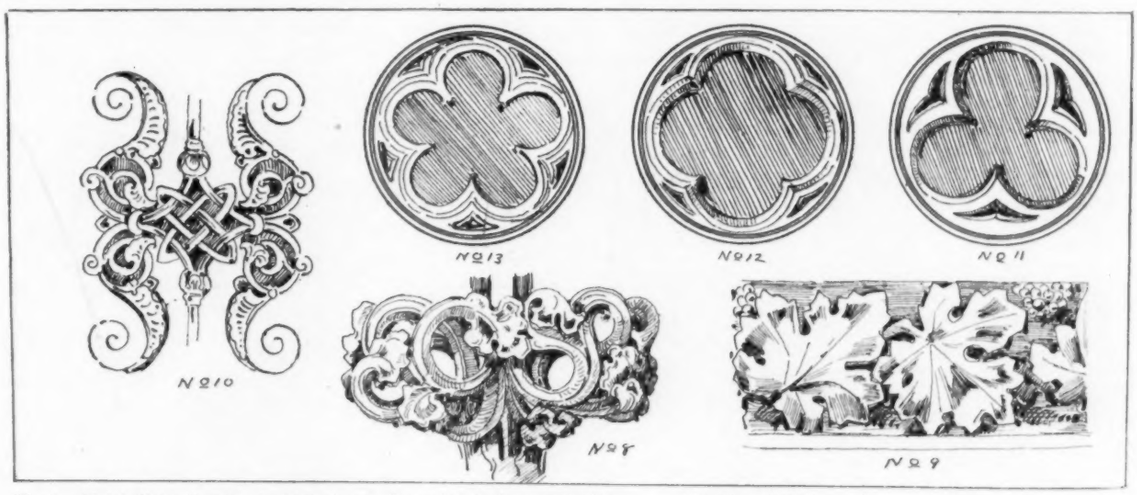
III.

Edward III (1327-1377)—Flowing or Decorated.

Richard II (1377-1393)—Transition from flowing lines to stiff, hard lines of Tudor or Perpendicular.

Henry IV to Henry VIII (1399-1546)—Decline evident.

The illustrations in Plates 8 and 9 will help to give some idea of the various characteristics and treatment of these various periods of the Gothic style. The next article will take up the next style in order—the Renaissance.



No. 8. Finial, From fountain in Rottenburg. Example late German Gothic.
No. 9. Cavetto moulding. Grapevine motif. Middle French period.
No. 10. Italian Gothic. Manuscript painting, 14th century. (Oriental influence.)
No. 11. Trefoil
No. 12. Quatrefoil
No. 13. Cinquefoil
} Characteristic Gothic tracery.

MARKET FOR BRASS IN MADRAS PRESIDENCY.

[From United States Consul Jose de Olivares, Madras.]

The attention of American manufacturers and exporters of brass is directed to the large market in this consular district for that metal, as shown by the imports into the Madras Presidency. During the official year ended March 31, 1912, the United Kingdom supplied $16,148 worth of wrought brass, Germany $1,490 worth, Belgium $2,125, with small shipments from Ceylon, Straits Settlements, France, Austria-Hungary, and Japan. From the United Kingdom also came $336,463 worth of mixed or yellow metal for sheathing, and $544,740 worth was purchased from Germany. The total value of wrought and unwrought brass and mixed or yellow metal imported into the Madras Presidency during the fiscal year 1912 was $902,251. The United States does not at present share in this trade

THE ELECTRODEPOSITION OF NICKEL*

A Paper Giving a Resumé of Past and Current Practice in the Art of Depositing Nickel on Metallic Bases.

By Oliver P. Watts.†

(Continued from July.)

II. BATHS CONTAINING DOUBLE SALTS.

In connection with these baths it will be of interest to review the patents of Adams under which for many years nickel plating was monopolized. His first U. S. Patent, 93,157, of August 3, 1869, claims:

"1. The electrodeposition of nickel by means of a solution of the double sulphate of nickel and ammonia, or a solution of the double chloride of nickel and ammonium, prepared and used in such a manner as to be free from the presence of potash, soda, alumina, lime, or nitric acid, or from any acid or alkaline reaction.

"2. The use, for the anode of a depositing cell, of nickel combined with iron to prevent the copper and arsenic which may be present from being deposited with the nickel or from injuring the solution.

"3. The electroplating of metals with a coating of compact, coherent, tenacious, flexible nickel of sufficient thickness to protect the metal upon which the deposit is made from the corrosive agents with which the article may be brought in contact.

"4. The deposition of electrotype plates of nickel to be removed from the surface on which the deposit is made and used separately therefrom."

It is easy to see how it was possible to monopolize nickel plating under this unjust patent. Even today manufacturers of anodes have not recovered from its baneful influence, but are still furnishing anodes in accordance with claim No. 2, to the great detriment of the nickel plating industry.

Adams patent, 100,961, March 22, 1870, is remarkable for its contradictory claims. "This improvement consists in the use of three new solutions from which to deposit nickel by the electric current: First, a solution formed of the double sulphate of nickel and alumina, or the sulphate of nickel dissolved in a solution of soda, potash, or ammonia alum, the three different varieties of commercial alum; second, a solution formed of the double sulphate of nickel and potash; third, a solution formed of the double sulphate of nickel and magnesia, *with* or without *excess* of *ammonia*. . . . I prefer to use these solutions at a temperature above 100 degs. F. (38 degs. C.), but do not limit my invention to the use of these solutions at that temperature. I therefore claim:

"1. The electrodeposition of nickel by means of a solution of the double sulphate of nickel and alumina, prepared and used in such a manner as to be free from the presence of ammonia, potash, soda, lime or nitric acid, or from any acid or alkaline reaction.

"2. . . . A solution of the double sulphate of nickel and potash, prepared and used in such a manner as to be free from the presence of ammonia, soda, lime, or nitric acid, or from any acid or alkaline reaction.

"3. . . . A solution of the double sulphate of nickel and magnesia, prepared and used in such a manner as to be free from the presence of potash, soda, alumina, lime or nitric acid, or from any acid or alkaline reaction."

In U. S. Patent 136,634, March 11, 1873, Adams' claim was still further extended. "I now claim . . . the electrodeposition of nickel, of the electroplating with nickel, by means of a solution of either of the soluble salts of nickel, such solution being prepared and being used substantially, free from the presence of potash, soda, lime, alumina, and nitric acid, or either of them, and free from acid and alkaline reaction, or from either."

a. NEUTRAL BATHS:

In this class will be included baths made by merely dissolving normal salts, as well as those solutions which have been carefully neutralized.

The bath most generally used is a solution of nickel ammonium sulphate.

101. Pfanhauser's solution. 75 grams of nickel ammonium sulphate per liter. Current density, 0.3 ampere per dm. Temperature 15 to 20 degs. C. Resistivity 24.6 ohms. 3.5 volts for 15 cm. between electrodes. Temperature coefficient 0.0176 for 1 deg. C. Specific gravity 1.047. Current yield 91.5 per cent. Deposit per hour 0.0034 mm. Cast anodes of ½ to ¾ the area of cathode should be used. The deposit is hard, good for plating iron or steel. Langbein says the cast anodes rapidly render the bath alkaline, necessitating a frequent correction of the reaction. Brochet (page 237) says: "This bath is poor in metal, even in case of the saturated solutions (98 grams at 18 degs. C.). It is better to replace a part of the double sulphate by the single sulphate." He recommends:

102. Solution of single and double sulphates:

Nickel sulphate	166 grams
Nickel ammonium sulphate	55 grams

Specific gravity 1.101, resistivity 23.9, at 18 degs. C., nickel per liter 39 grams. "Baths rich in metal possess the advantage of greater covering power and are less influenced by cold. The addition of ammonium sulphate is sometimes recommended to increase the conductivity of the bath; this should not be done, since it results in the impoverishment of the bath in metal."—Brochet.

103. The double sulphate with ammonium sulphate:

Nickel ammonium sulphate	50 grams
Ammonium sulphate	50 grams

"E. M. F. at 10 cm. 1.8 to 2 volts. Current density 0.35 ampere. The bath deposits rapidly, and all metals (zinc, lead, tin, and Britannia, after previous coppering) can be nickeled in it. Upon rough castings and iron, a pure white deposit is difficult to obtain. On account of the great content of ammonium sulphate in the bath, the deposit piles up, especially on the lower portions of the objects, which readily become dull, while the upper portions are not sufficiently nickeled."—Langbein.

104. Pfanhauser gives:

Nickel sulphate	50 grams
Ammonium chloride	25 grams

Specific gravity 1.0357 (5 degs. Bé.). Resistivity 17.6 ohms. Temperature coefficient 0.025. E. M. F. for 15 cm. 2.3 volts. Current density 0.5 ampere. Current yield 95.5 per cent. Deposit per hour 0.0059 mm. Cast anodes half the area of cathode. Langbein gives 57 grams and 29 grams, respectively, of the same salts, and states that the deposit is soft and white, that heavy deposits cannot be obtained because of the danger of peeling, and that the bath is not suited to the direct nickeling of iron.

*A paper presented at the twenty-third General Meeting of the American Electrochemical Society, at Atlantic City, N. J., April 3-5, 1913.

†Department of Applied Electro-Chemistry, University of Wisconsin.

105. Bath with magnesium sulphate:

Nickel ammonium sulphate	56 grams
Magnesium sulphate	26 grams

"E. M. F. 4 volts at 10 cm. Current density 0.2 ampere. Good for plating on iron, and may be used for the direct nickeling of zinc. The deposit is soft and of a yellowish tinge. The bath does not remain constant, but fails after working three or four months, even cast anodes being but little attacked."—Langbein.

Watt experimented with a solution containing the sulphates of nickel and magnesium. At first the deposit was decidedly yellow in tone, but became whiter after a few hours' use of the solution.

Adams' patent of the double sulphate of magnesium and nickel has already been noticed.

106. To a solution of nickel ammonium sulphate Watt gradually added a concentrated solution of ammonium citrate. A bright deposit of a slightly yellowish tone was obtained, which retained its brightness during deposition for a long time, but finally became dull. The deposit was soft enough to be burnished. There was a brick evolution of gas at the anode, and a few bubbles of hydrogen clung to the cathode.

107. Langbein gives a somewhat similar bath, as do C. H. Procter and Pfanhauser:

	Langbein	Procter	Pfanhauser
Nickel sulphate	26.0 grams	30 grams	40 grams
Ammonium chloride	17.5 "	30 "	0 "
Potassium citrate	17.5 "	18 "	35* "

*Sodium citrate.

Langbein specifies for copper and copper alloys: Current density 0.45 to 0.5 ampere, E. M. F. at 10 cm. 1.5 to 1.7 volts. For zinc, current density 0.8 to 1 ampere, E. M. F. 2 to 2.5 volts.

Pfanhauser gives a current density of 0.27 ampere, E. M. F. at 15 cm. 3.6 volts. Specific gravity 1.039 (5½ degs. Bé.). Resistivity 51.7 ohms. Temperature coefficient 0.0348. Current yield 90 per cent. Deposit per hour 0.00301 mm. Rolled anodes. The bath yields a soft white deposit, and is specially suited for plating pointed objects like knives.

108. An English solution:

Nickel ammonium sulphate	100 grams
Ammonium acetate	50 grams

109. Another English solution:

Nickel ammonium acetate	100 grams
Ammonium chloride	20 grams
Glycerine	5 grams

110. Nickel and ammonium chlorides:

Nickel chloride, cryst	37.5 grams
Ammonium chloride	37.5 grams

The bath is neutralized by ammonia. E. M. F. at 10 cm. to 1.75 to 2 volts; for zinc, 2.8 to 3 volts. Current density 0.5 ampere. "The bath deposits readily, and is especially liked for nickeling zinc castings."

111. H. P. Dechert's solution:

Nickel chloride, cryst. at least	141 grams
Calcium chloride solution of 30° Bé. (sp. g. 1.261)	1 liter

The advantages claimed for this solution are very low resistance, elimination of hydrogen bubbles from the surface to be plated, thus removing the danger of spotting, a permanent and enduring solution, and a smooth, close and tough deposit of nickel.

112. Watt gradually added to a solution of nickel sulphate a solution of ammonium tartrate, and obtained a very bright and very white deposit of nickel.

b. ACID BATHS:

E. Weston in his patent claims: "1. The electrodeposition of nickel by means of solutions of the salts of nickel containing boric acid, either in its free or combined state.

"2. A solution of the single or double salts of nickel to which has been added boric acid, either in its free or combined state." The exact composition of the baths is not stated by Weston. He claims that the addition of boric acid or its compounds prevents the deposition of sub-salts upon the cathode, renders the solution more constant and stable in composition, diminishes the liability to the evolution of hydrogen, permits the use of a more intense current, and improves the character of the deposit by rendering it less brittle and by increasing the tenacity with which it will adhere to a metal surface.

Langbein says: "Boric acid, recommended by Weston as an addition to nickeling baths, has a favorable effect upon the pure white reduction of the nickel, especially in nickeling rough castings. . . . Numerous experiments have shown that the deposit of nickel from nickel solutions containing boric acid is neither more adherent nor softer and more flexible than that from a solution containing small quantities of a free organic acid. Just the reverse, the deposit is harder and more brittle in the presence of the boric acid.

"Weston recommends the following composition for baths:

"113.	Nickel chloride	26 grams
	Boric acid	10.5 grams
"114.	Nickel ammonium sulphate	38 grams
	Boric acid	19 grams

"Both solutions are said to be improved by adding caustic potash or caustic soda so long as the precipitate formed dissolved. These compositions, however, cannot be recommended, because the baths work faultlessly for a comparatively short time only."

115. Pfanhauser gives:

Nickel ammonium sulphate	40 grams
Ammonium chloride	15 grams
Boric acid	20 grams

Current density 0.5 ampere. E. M. F. for 15 cm. 2.8 volts. Resistivity 20.85 ohms at 15 degs. to 20 degs. C. Temperature coefficient 0.0156. Current yield 89.5 per cent. Deposit per hour 0.00556 mm. Specific gravity 1.0357 (5 degs. Bé.). He, too, speaks of the difficulty of regulating the bath, and recommends cast anodes of half the surface of the cathode.

Maigne and Mathey ascribe to Weston the two baths which follow:

116.	Nickel chloride	50 grams
	Boric acid	20 grams
117.	Nickel sulphate	50 grams
	Boric acid	17 grams

118. Bath of Julius Weiss:

Nickel sulphate	40 grams
Ammonium chloride	20 grams
Citric acid	2 grams

119. Langbein gives:

Nickel ammonium sulphate	64 grams
Ammonium sulphate	20 grams
Citric acid	4.4 grams

E. M. F. 2 to 2.2 volts at 10 cm. Current density 0.34 ampere. The materials are dissolved in boiling water, and ammonia is added until blue litmus paper is only

slightly reddened. Very careful regulation of the current is required to avoid peeling off. The anodes should be cast and rolled in equal numbers. According to experiments by Dr. Langbein it is better to decrease the amount of ammonium sulphate to 2 grams.

This bath is operated so nearly neutral that it closely resembles bath No. 107.

120. J. H. Potts uses:

Nickel acetate	28 grams
Calcium acetate	16 grams
Acetic acid, sp. g. 1.047 (35 per cent.)	8 grams

Potts claims: "I have succeeded in producing a nickel-plating solution having the advantages of the presence of free acid and of great density, and yet free from the objections which have been heretofore made to acid solutions. . . . To the presence of the acetate of lime I also attribute the fact, which I have discovered in practice, that in the use of my solution no such care and nicety in the regulation of the electric current are necessary as in the use of the ordinary solutions. . . . Another advantage of my solution is the entire freedom of iron work plated in it from liability to corrosion after removal from the cleansing bath of warm water in which it is necessary to place it after leaving the plating solution, thus obviating a very serious objection heretofore made to the presence of free acid in a nickel-plating solution—an objection which has been found to exist in the use of ordinary solutions." Watt (p. 297) quotes Wahl as follows: "It gives satisfactory results without that care and nicety in respect to the condition of the solution and the regulation of the current which are necessary with the double sulphate solution. The metallic strength of the solution is fully maintained without requiring the addition of fresh salt, the only point to be observed being the necessity of adding from time to time (say once a week) a sufficient quantity of acetic acid to maintain a distinctly acid reaction. It is rather more sensitive to the presence of a large quantity of free acid than to the opposite condition, as in the former condition it is apt to produce a black deposit, while it may run down nearly to neutrality without notably affecting the character of the work. The deposited metal is characteristically bright on bright surfaces, requiring but little buffing to finish. It does not appear, however, to be so well adapted for obtaining deposits of extra thickness as the commonly used double sulphate of nickel and ammonium. On the other hand, its stability in use, the variety of conditions under which it will work satisfactorily and the trifling care and attention it calls for make it a useful solution for nickeling."

(To be concluded,)

PRACTICAL EXPERIENCE IN SILVER PLATING

Mr. Aubrey Dakin at a meeting of the Sheffield Electro-Metallurgical Society, gave some interesting results of his experiences as a practical man in the silver and electro-plating trade.

He said that a very convenient method which he did not think was generally adopted in the trade was to keep the work which was not finished—plated—in a spare vat overnight in a slightly alkaline solution of water and potash with a little cyanide; they could be put straight into the vat next morning as clear from tarnish as when they came out, thereby saving a lot of time waiting for finishing. A lot of scratch brushing, as now advocated, is unnecessary and absolutely useless for common and medium deposits on plain spoons and forks and clean hard soldered hollow ware.

There is at present, he said, a big demand for table and dinner knives which are stuck on by the Bamsell patent cement, which, when plated after being filled, show a spongy deposit wherever there is the slightest pin hole in the soldering of the handles and around the bolsters, which is caused by the action and the sulphur which the cement contains. All this can be avoided if the handles are plated before being stuck on. After plating they must be carefully varnished and dried and then they can be filled in the ordinary way without the cement eating into the deposit.

The quicking or solution should be one that the plater should keep a strict eye upon. It is an advantage to use the red mercurial oxide dissolved in plenty of cyanide, rather than adopt the old method of dissolving one's own quicksilver. The objects of the use of this solution should always be borne in mind, viz., first, that it is to render the surface less positive and hence there will be less chance of the silver being deposited by simple immersion; second, to prevent oxidization, and third, to act as a cement, binding the deposited silver to the surface deposited upon.

STEEL PLATING.

With regard to steel plating, he has found that this metal is one that one cannot be consistently successful with. Many of the causes arise outside the plating shop. For instance, the chief reason why etched steel blades have a pitted appearance in the deposit is that inferior varnish has been used which will not do for ordinary unplated steel work. Then again, we have blades which have rusted badly since grinding and cannot be satisfactorily bottomed by buffing ready for the plating process, which he declared would be satisfactory for ordinary steel finish. When these blades are plated under such conditions it will be found that they have an exaggerated starry appearance from each pit hole. This may be obviated to a great extent by an acid pickle composed of three parts of sulphuric acid to one hundred of water with a few drops of hydrochloric acid. Many platers might think this unnecessary, but he considers it essential for really successful results.

There has been some little interest taken recently in the trade of what has been termed differential plating applied to forks and spoons. He remembered some years ago having a spoon of American manufacture which had been sold under such a specification. There was no doubt as to its advantage in wear, seeing that it had an extra deposit of silver on its bearing parts, but he found that after stripping the spoon of its normal plate the other was an alloy of silver, probably silver solder which could have been laid on (say in a muffle or furnace) in little hollows made by an emery wheel or a die when the spoon was in its first stage as a pierced blank. It would afterwards be stamped and go through the regular routine with no more trouble than the ordinary work. He tried several experiments to complete this by electrical deposition, but was not successful from a commercial standpoint.

INSULATED ALUMINUM CABLES.

The Paris Omnibus Company has placed an important contract for aluminum armored cables for tramway feeder networks. The cables will have cross sections up to 1,000 square millimeters (1.55 square inches), and are for a pressure of 500 volts.

THE MANUFACTURE OF WROUGHT BRASS

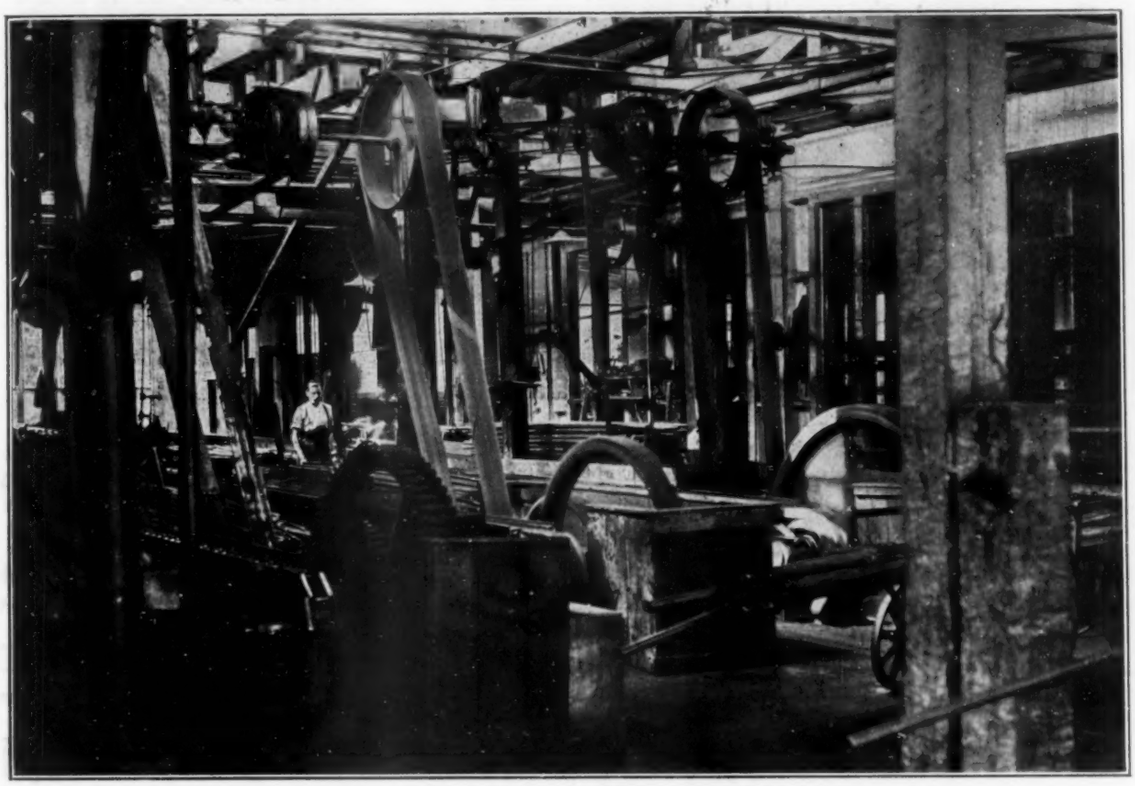
A Description of Modern Methods for the Production of Plate, Sheet, Rod, Wire and Tube.

By L. J. Krom.

(Continued from January.)

SEAMLESS TUBES.

Seamless tubes may be divided into five separate and distinct classes: Those manufactured from hollow or cored castings, those made from a solid billet, which is then rolled so that the center is pierced out by revolving mandrels, thus making a tube, those which are extruded by means of an extruding press similar to the process of making extruded rods and shapes as has been previously described,* tubes made from sheet circles which are cupped up and formed into tubes by hydraulic pressure and finally a new process by which tubes are made by pouring metal into a rapidly revolving mold.



VIEW OF SEAMLESS TUBE MILL AT PLANT OF RANDOLPH CLOWES COMPANY, WATERBURY, CONN.

The cupping process is probably the easiest and most economical way of making a seamless tube down to a certain definite diameter and gauge. It is rare, now-a-days, to find a seamless tube made from a casting or billet much over five inches in diameter after the initial casting. If the finished tube is more than 4½ or 5 inches in diameter it is usually made by the cupping-up process from sheet metal.

MANUFACTURE OF SEAMLESS TUBES FROM SHEET METAL.

The raw material, whether it be brass or copper, is first cast in the form of a large cake, the weight and size of which will vary according to the character of the tubing that is desired to make from it. If the tubing is to be copper, then the copper cakes are purchased from a copper smelting company direct according to certain specifications made necessary by the requirements of the tube manufacturer. Most of the tubing manufacturers make their own brass tubing mixture.

These mixtures are poured into iron moulds and the melting processes are exactly the same as have been already described in the manufacture of sheet brass. The metal mixtures will vary from 60 parts of copper and 40 parts of spelter, Muntz metal mixture, up to 68 parts of copper and 32 parts of spelter, which makes, as has been stated before, a good high brass mixture. For general purposes in the manufacture of seamless brass tubing a mixture of 66 parts of copper and 34 parts of spelter is the one most universally used, and is known as two and one or yellow metal. Of course, there are a number of other mixtures that are employed in the manufacture of seamless brass tubing, as, for instance, we have what is known as leaded brass tubing, the mixture of which would be 64 parts of copper, 34½ parts of brass and 1½ parts of lead. A Tobin bronze tubing which runs from 61 to 63 parts of copper, 35½ to 38 parts of spelter and 1 to 1½ parts of tin, and all sorts of special mixtures which are used by the various manufacturers for their own particular purpose.

Only the 60 and 40 mixture is used for the cupping up process; the other mixtures are made from castings with sand cores.

After the cake of 60 and 40 mixture has been poured it is taken from the casting shop to a planing machine and the top or shrink side is planed off smooth. This is done whether the cake is of copper or brass. The planed

*The Metal Industry, January, 1912.

cake of metal is then placed in a heating furnace and heated to a cherry red temperature, after which it is passed between very heavy slow moving steel rolls, which are shown in Fig. 48. The metal is rolled until it is of the required gauge, which has been specified by the order department of the mill. This may be anywhere from a ½ to ⅞ of an inch in thickness, according to the size, width and length of tubing that the cake is destined to be turned into.

The sheet of metal is now allowed to cool and is then taken to a circling machine and a circle of the required diameter is cut from it. This circle is then annealed and finally pickled in a mixture of sulphuric acid and water registering about 8 to 12 degs. Baumé. The circle is now ready for the cupping-up process and this is accomplished by the means of the machine shown in Fig. 49. This machine is simply a gigantic hydraulic draw bench, having at one end a die-holder which holds the die through which the formed tube is forced and the other end contains the motive power by means of which the steel punch is forced through the die, carrying with it the tube in the process of formation.

The evolution of the seamless tube from the circle to the finished cylinder or tube is most interesting, consisting of simply a series of cupped-up shells whose diameter varies with the depth. This shell, of course, is closed at one end and this rounded end is finally cut off, leaving the tube in its finished condition. The method of severing the closed end and the jagged sides of the open end is by means of a metal saw, a cut of which is shown in Fig. 50.

The cupping-up process, as practised today, usually ends with the tube at 5 ins. in diameter, and if it is desired to carry this same 5-in. tube down to any smaller gauges this is done on chain draw benches, a type of which is shown in Fig. 51. This drawing process consists simply of slipping the tube over a drawing mandrel, there being a shoulder on the inside of the tube which prevents the mandrel from going all the way through. The projecting end of the mandrel is then grasped by the grip of the chain and the tube is drawn or pulled through the necessary size die to ensure of its being drawn to a smaller diameter.

Of course, between each separate drawing or reduction that the tube undergoes there must be the usual annealings and picklings, such as were described in a previous

FIG. 48. VIEW OF HOT ROLLS FOR ROLLING SHEET COPPER AND BRASS IN PLANT OF MICHIGAN COPPER AND BRASS COMPANY, DETROIT, MICH.

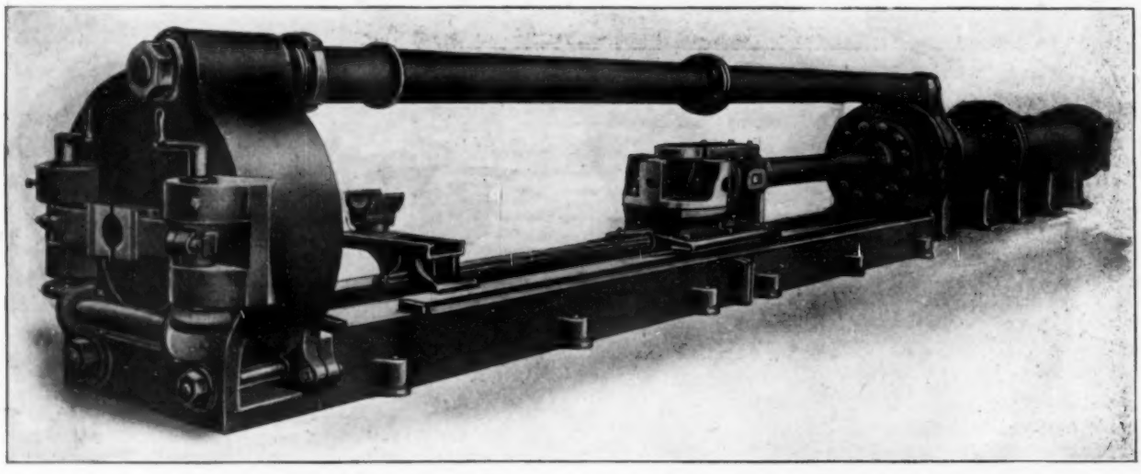


FIG. 49. HYDRAULIC SEAMLESS TUBE MILL. MANUFACTURED BY WATERBURY-FARREL FOUNDRY AND MACHINE COMPANY, WATERBURY, CONN.

part of this article in the manufacture of sheet brass. The annealing is done in the regular wood, coal, gas or

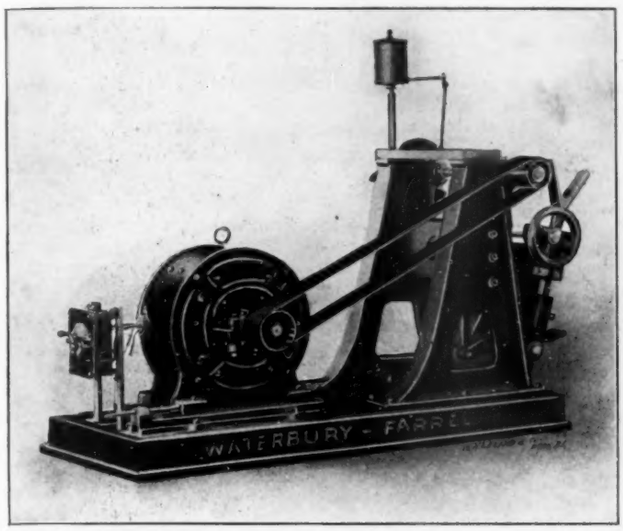


FIG. 50. ELECTRICALLY DRIVEN METAL SAW FOR CUTTING METAL TUBES. MADE BY WATERBURY-FARREL FOUNDRY AND MACHINE COMPANY, WATERBURY, CONN.

oil fired annealing muffle furnace, a photograph of which was shown in the January, 1912, issue of THE METAL

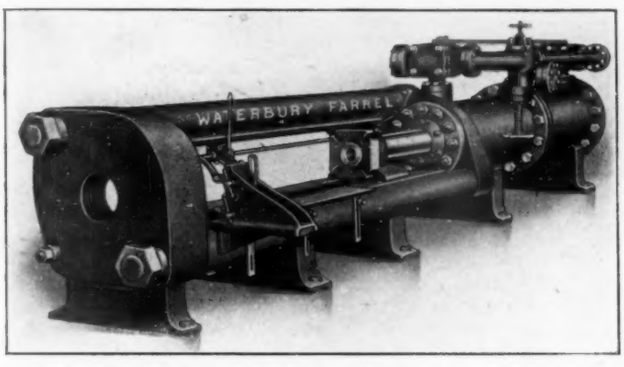


FIG. 51. REDRAWING SEAMLESS TUBE BENCH. MADE BY WATERBURY-FARREL FOUNDRY AND MACHINE COMPANY, WATERBURY, CONN.

INDUSTRY. The pickling, which follows the annealing in order to remove the fire scales formed on the metal when in the muffle, for either brass or copper is the same as is used for sheet brass and rods, a solution of sulphuric acid and water contained in lead-lined tanks.

The tubes after passing through the various stages of reduction go from one draw bench to another which, of course, must increase in length as the tube becomes

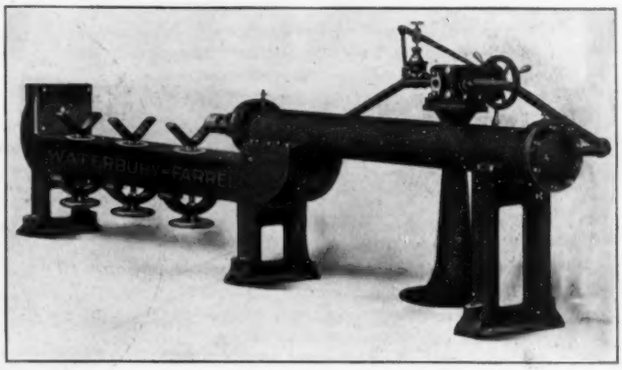


FIG. 53. MACHINE FOR REMOVING CORES FROM SEAMLESS TUBE CASTINGS.

longer and smaller in external and internal diameters. The actual reduction which each separate circle or tube in the process of formation undergoes is a matter of experience and is usually peculiar to the particular mill in which the tube is manufactured. The speed of the hydraulic machines, draw benches and various other operations which take place are also peculiar to each mill and it would be impossible to give definite figures on this particular end of the subject.

TUBES FROM CASTINGS.

In making seamless tubes from castings, the castings are poured into cannon shaped iron molds and will vary in size from 8 inches in diameter down to 1½ inches. The billets will weigh anywhere from 250 pounds for an 8-inch tube casting to 50 pounds for a small 1½-inch one. Seamless tube castings are cast round a destructible core made of yellow clay ground and mixed with salt hay and wound around an iron pipe perforated with holes. The core is baked and when used is porous, thus allowing the gases from the metal to pass through it to the core barrel and thus to escape. After the tube has been cast and cooled off with water the core is removed by either hammering the core barrel back and forth until the core has been broken up enough to allow it to be drawn out of the tube or a more modern way is to use the machine shown in Fig. 53.

(To be continued.)

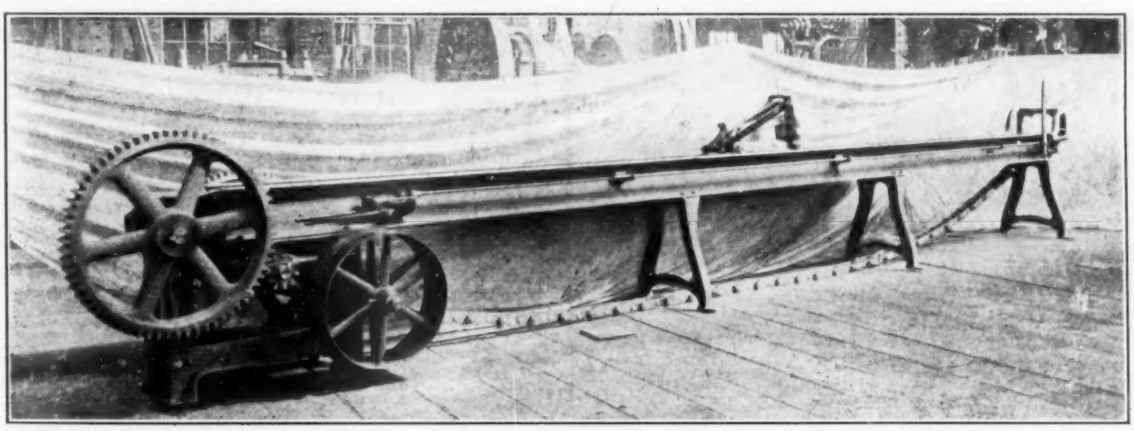


FIG. 52. A SEAMLESS TUBE CHAIN DRIVEN DRAW BENCH AT THE PLANT OF RANDOLPH CLOWES COMPANY, WATERBURY, CONN.

ALLOYING OF ALUMINUM*

SOME INTERESTING RESULTS IN THE PRACTICAL ALLOYING OF ALUMINUM.

BY C. H. IVINSON.†

C. H. IVINSON.

It is generally admitted that pure commercial aluminum is entirely unsuited for most engineering purposes, owing to the fact that it is too soft, has little mechanical strength, is rather difficult to cast, and does not lend itself to easy working. In general engineering work the alloys of aluminum are much more important than the pure metal; but the indiscriminate use of metals to form aluminum alloys has given the latter metal a bad reputation. Aluminum alloys with every known metallic element, accompanied by disengagement of heat, and is particularly active in combining with copper. Most of the alloys are chemical combinations of the metal, rather than mechanical mixtures, the alloys with lead, antimony and mercury being exceptions, as these metals do not alloy very easily with aluminum.

The useful alloys of aluminum seem to fall in three groups, viz.:

(1) Aluminum containing not more than 10 to 25 per cent. of added metals.

(2) Metals containing not more than 10 to 15 per cent. of aluminum.

(3) Alloys of rare metals with aluminum containing from 0.5 to 5 per cent. of added metal.

In order to make aluminum harder, stronger and of better wearing properties, at the same time keeping its valuable lightness and beautiful color, it is alloyed with small percentages of such suitable metals as manganese, zinc, tin, copper, nickel, etc. It has been the writer's privilege to alloy aluminum with almost every metallic element, some of the resultant alloys being only curiosities, the cost of production making them of no commercial value.

COMMON ALLOYS OF ALUMINUM.

For the purpose of the present paper the writer will first briefly deal with the commoner alloys, the best known being an alloy of copper and aluminum containing from 4 to 10 per cent. of copper, and the aluminum-zinc alloys containing from 8 to 30 per cent. zinc. Zinc is the cheapest known hardener of aluminum, and in quantities up to 15 per cent. combines to increase the rigidity and strength of the aluminum. Tin when alloyed alone with aluminum appears to develop brittleness, and alloys of 15 per cent. of tin and aluminum have been known to entirely disintegrate in the course of a few days. Nickel added by itself to aluminum produces unstable alloys. An alloy of 4 per cent. nickel has been shown to disintegrate in a very short space of time after being cast, but the introduction of a third element, such as copper, is an advantage. Phosphide of copper added in quantities of 1½ per cent. to a zinc-aluminum alloy containing from 12½ to 15 per cent. zinc gives fluidity to the molten metal. Phosphide of zinc containing 25 per cent. phosphorus may be substituted in the proportion of 0.05 per cent. This is one of the best fluxing and cleansing agents the writer knows for all aluminum alloys, and should be added to the molten alloy for a few minutes before pouring by wrapping in paper and plunging to the bottom of the crucible by means of tongs and stirring briskly.

Magnesium-aluminum alloys containing 1 to 10 per cent. magnesium are much improved by the addition of 5 per cent. zinc, as this addition imparts better wearing properties to the metal and aids in producing homogeneous castings. By the addition of 1 per cent. phosphide of copper less oxidation of the metal takes place during the melting operations.

A few notes on the behavior of the alloys of copper, nickel, magnesium and zinc may be appreciated. All these alloys have good tensile strength when newly made, but in the course of time chemical and electrolytic actions render some of them very brittle, and in a good many cases lead to the entire disintegration of the alloy, especially if iron, sodium and silicon are in the metals is impurities. Aluminum is very liable to take up silicon from the crucible, especially if overheated. It is most important that these alloys should be melted without fluxes—fluxes such as mixtures of sodium and potassium chloride. Zinc chloride acts on the crucible, thereby causing the aluminum to wet the sides of the crucible and dissolve out the silica which in the presence of moisture liberates silicon hydride, which, in time, causes the entire disintegration of the alloy. Too much stress cannot be put upon the fact that the metal must be melted at as low a temperature as possible, namely, a temperature which will cause the metal to become fluid. Aluminum absorbs sulphur at a bright red heat, and the gas is liberated when the metal is poured into the moulds, causing porous and "blow-holey" castings. Aluminum alloys should always be melted in crucibles having good, tight-fitting lids to prevent, to some extent, the absorption of sulphur from the fuel being used. Aluminum when heated to too high a temperature also absorbs nitrogen and hydro-carbons. The writer has found a small piece of potassium nitrate (an egg-spoonful to 100 pounds of metal) wrapped in filter paper, to be the best means of removing these occluded gases. A brisk reaction takes place which expels these occluded gases. After the reaction has ceased the metal is poured at as low a temperature as possible, the pouring temperature affecting the tensile strength in a very marked degree.

After numerous tests the writer is of the opinion that silicon and sulphur are two of the deadly enemies of aluminum alloys, especially when the metal is overheated. One of the best types of furnaces the writer has found, after a great many trials, for melting aluminum and its alloys is a furnace which uses gas and air under pressure, which is blown in by means of a Leimans' blower. Such a furnace is made by Messrs. Fletcher, Russell & Company, Limited, of Warrington, and is ideal for melting metal, especially if fitted with a tilting device. The pressure used on the blower is 4 to 6 pounds per square inch.

It is always advisable when making up an alloy of

*Paper read at British Foundrymen's Association annual convention in London, June 21 to 24, 1913.

†Chemist and Metallurgist to National Alloys, Limited, Ilford.

aluminum to make a concentrate of the metal which is to be alloyed with the aluminum, i. e., to first make, say, a 20 or 25 per cent. concentrate metal and add this in the proper proportions to the molten aluminum.

SOME RARE METAL ALLOYS.

During the past few years metallurgists have been experimenting with some of the rarer metals, and this part of the subject is most interesting. The writer has personally alloyed aluminum, as previously stated, with almost all the rarer metallic elements, such as cerium, neodymium, lanthanum, tantalum, zirconium and berryllium, and some of these alloys gave most remarkable results even in quantities of only 1 per cent. and under. Cerium and beryllium are particularly interesting, 0.5 per cent. of cerium exerting a most wonderful effect on the aluminum, raising the tensile strength of the metal from 4.5 tons per square inch to 10.3 tons per square inch, and giving an elongation of 8.5 per cent. on 2 inches. The modus operandi is to reduce the fluoride of cerium. This alloy was placed in seawater and boiled for 60 hours; the sample was carefully weighed before and after the boiling process, and it was found that the metal was the same weight as before being experimented upon. One side of the metal was polished, and after the boiling it was found to be untarnished.

Another interesting alloy is one of beryllium or glucinum. An alloy of 2 per cent. beryllium gave a tensile strength of 11.8 tons per square inch, with an elongation of 10 per cent. on 2 inches. It was of a beautiful silver-white color, and could be hammered out cold into leaf; it also withstood the action of seawater perfectly. This alloy was made by the reduction of beryllium fluoride.

HIGH MELTING POINT ALLOYS.

A good many experiments have been made during the past two or three years with alloys of manganese, titanium, chromium, molybdenum, tungsten, etc., and a few notes may be here given on the behavior of these metals when alloyed with aluminum. They form a very interesting series of alloys, either when alloyed by themselves or in the presence of copper. Titanium and chromium alloys are both affected by sea-water and ordinary atmospheric conditions. The former alloy, when polished in the presence of seawater develops white spots on the metal which, when removed, show deep pit marks on the surface of the metal; and the same remarks apply to the alloys of chromium. Two methods have been employed to manufacture these two alloys: (1) The reduction of titanium and chromium oxide in a magnesite-lined crucible by means of powdered aluminum; (2) the reduction of the oxide of the metals by molten aluminum, using cryolite and potassium chloride as fluxes. The modus operandi is first to melt the cryolite in the crucible and dissolve the oxide of the metal in the molten cryolite and adding to the same molten aluminum, when a complete reduction of the titanium and chromium takes place. Calculating the amount of metallic titanium required, $3\ Ti\ O_2 + 4\ Al.\ 3\ Ti + 2Al_2O_3$. These metals give very rigid and hard alloys. The tensile strength of the one containing 2 per cent. of metallic titanium was 10.4 tons per square inch, and the elongation 4.5 per cent. on 2 inches. The alloy with chromium, containing 1.5 per cent. metallic chromium, had a tensile strength of 9.34 tons per square inch, with elongation of 2½ per cent. on 2 in. But the behavior of these alloys in resisting atmospheric conditions was far from satisfactory.

Tungsten has been recommended as being a suitable metal to alloy with aluminum to resist corrosion, but in the hands of the writer this has not proved very satisfactory. An alloy containing 2 per cent. copper and 0.5 per cent. tungsten rapidly disintegrated under ordinary atmospheric conditions. At least 100 different samples of this alloy were prepared in the varying proportions of 0.2 to 5 per cent. pure tungsten alloyed by itself with the aluminum, and also in conjunction with nickel, manganese, copper, etc. The results of some of these were disappointing. The alloy of zinc and nickel containing 3 per cent. nickel and 0.75 per cent. zirconium gave extraordinary results as far as tensile strength was concerned, having 12.2 tons per square inch, with elongation 9 per cent. on 2 inches. Its behavior in sea-water was very extraordinary; it was boiled for 72 hours in sea-water, and when tested, after the boiling process, it only showed 4 tons per square inch tensile strength; its fracture was very crystalline, and it was also very brittle.

Zirconium 0.75 per cent., when alloyed with aluminum without the presence of nickel, gave the same tensile strength after the boiling process as before, namely, 9.3 tons per square inch. Molybdenum when alloyed with aluminum had the opposite result. An alloy was made containing 1.5 per cent. molybdenum with aluminum, which, after being boiled in salt water, gave a lower tensile strength than before the boiling; but when the molybdenum was alloyed with the aluminum in the presence of copper in the proportions of molybdenum 1.5 per cent., and copper 1.5 per cent., the tensile strength of the metal after the boiling process was the same as originally. This makes the theoretical alloying of aluminum a very fascinating subject, as it is almost impossible to theorize or to account for the peculiar behavior of these different elements when combined alone or in conjunction with another in aluminum. Within recent years several alloys have been put on the market for which sea-water resisting properties and resistance to ordinary atmospheric influences are claimed. It is no doubt working on the above lines that such alloys have been made possible. The only drawback of the rare elements is their prohibitive costs, but it is to be hoped that chemists and metallurgists will go on experimenting to produce these rare elements at a commercial price; and no doubt a lot has been done in this direction since the advent of the Goldschmidt process for the reduction of the rarer metals from their oxides by means of powdered aluminum.

MISTREATMENT OF ALUMINUM.

There is no doubt that aluminum has obtained its bad reputation through the unscientific mixing of metals, and the compositions of some of the most successful alloys which withstand the action of sea-water are rigidly guarded as secrets. Aluminum was boomed too greatly some years back; it was put forward as being the cure-all for blowholes in brass, iron and steel, also for promoting the fluidity of zinc for galvanizing processes, etc. In the writer's opinion aluminum ought to be added very sparingly to brass, especially if the latter has to be remelted several times, as on each remelting the aluminum oxidizes, rendering the brass porous and reducing greatly its mechanical strength. The same applies to steel; the aluminum ought to be added extremely sparingly. For steel it is better added as a titanium-aluminum alloy, and for the brass as a manganese-aluminum or titanium-aluminum alloy; for titanium and manganese seem to counteract the evil effects of the aluminum. The writer has used an alloy of 50 per cent. titanium and 50 per cent. aluminum with very good results.

EMERY AND POLISHING WHEELS

A Few Suggestions on How to Use Them.

By Easy Way.

No emery wheel of six inches or larger should be run without a guard securely fastened to the frame. This guard should be not more than two inches from the outer edge of the wheel and should project one-half inch over each side of the wheel. No matter what make you use there is a possibility of its breaking while running. A guard need not cost over five dollars, and this small sum may save a life, also it may save you as many hundred dollars in damages. No wheel should be run except on a good arbor and stand perfectly balanced, with good collars, and "always" use washers on the side of the wheel a little larger than the collars. These should be made of soft paper (blotting) or rubber packing about one-sixteenth of an inch thick. Be careful to have the collars screwed up tight. Never force a wheel on the arbor if too tight; enlarge the hole. Be sure the rest is kept close to the wheel and well secured so that the work cannot get caught. Most wheels are run too fast to do good work—5,500 feet at the periphery of the wheel is the highest speed at which any wheel should be run. Many times glazing is caused by running the wheel too fast. Reduce the speed and the wheel will likely cut nicely and last much longer than a softer one.

Many times the cause of wheels breaking while running is due to two pulleys on the arbor, and with the speed of the large pulley as high as the wheel should run. Then as soon as the overseer is not looking the operator will throw the belt on to the fast speed. The next thing is a suit for damages by the operator or his family. To determine the proper speed for any diameter of emery wheel multiply the diameter in inches by 3.1416 and after reducing to feet divide 5,500 by it. Thus, a ten-inch wheel would give us $10 \times 3.1416 = 31.416$ inches or 2.6 feet. $5{,}500 \div 2.6 = 2{,}108$ revolutions. Imagine a wheel 1,757 feet in diameter ($5{,}500 \div 3.1416$) could only revolve once a minute to make the required speed. Now reverse the theory, a wheel one foot in diameter must revolve 1,757 times to make 5,500 feet per minute. Let us reduce this to inches by multiplying by 12 and we have $1{,}757 \times 12 = 21{,}084$ inches. A wheel 21,084 inches diameter must revolve once per minute or a one-inch wheel revolves 21,084 times per minute for the right speed. So keeping this for a constant number we can find the correct number of revolutions by dividing the constant by the diameter in inches and also enable us to find the correct diameter wheel to use and to experience the best possible results.

Polishing wheels of different type are all run at a much higher speed than emery wheels, but the same precaution must be exercised. That is to say, a guard will save the user damages. The arbor should be kept in good condition and driven by an endless belt with not too much tension, for the bearings will suffer from the unnecessary friction. Following are satisfactory speeds for different type polishing wheels:

	Per Minute.
Wood, leather covered	7,000 feet
Walrus hide	8,000 "
Ray wheels	7,000 "
Hair brush wheels	12,000 "

A very simple inexpensive automatic emery and glue remover is shown in the accompanying sketch and is self-explanatory. This rig can be located in any out of the way place and driven by a slow running belt. It will systematically remove all glue and emery from leather-covered wheels. The belt-driven roll rotates the polishing wheel and this in turn drives the idle roll. Both these rolls revolve in the necessary amount of water in the box to reach the faces of the wheels. With this plan fifty wheels at a time can be in action as easily as one. The only difference is the length of the water box to meet the requirements.

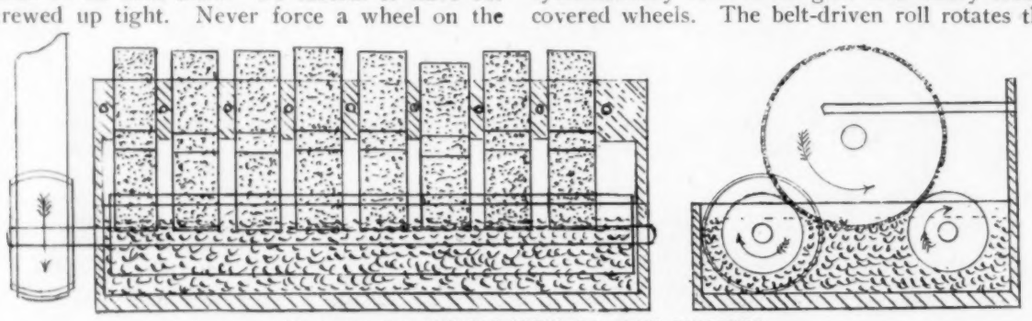


FIG. 1. DIAGRAMMATIC VIEW OF GLUE REMOVER.

RUSSIA'S COPPER INDUSTRY.

[United States Consul General John H. Snodgrass, Moscow, Russia.]

Among the many branches of the Russian metal industry the manufacture of copper is remarkable for its rapid development. Seven years ago the 10,000 tons that constituted the output of all the existing works did not meet even half of the requirements of the country. In 1907 the Russian production was 14,750 tons; in 1910, 23,000 tons; 1911, 26,500 tons; and during six months of 1912 the total output was 16,600 tons. The Empire's consumption of copper and the percentage thereof which was of Russian origin are shown below (beginning with 1908 the figures of consumption include also the amount stored):

Years.	Tons of copper consumed.	Percentage of Russian copper used.	Years.	Tons of copper consumed.	Percentage of Russian copper used.
1906	24,000	43.5	1909	21,900	83.6
1907	18,485	79.7	1910	28,450	76.6
1908	18,625	77.1	1911	31,700	74.9

In 1912 several new works were opened, and the total output for that year will aggregate some 30,000 tons. In 1907 the production of electrolytic copper was started in Russia and amounted to 5,000 or 7,000 tons. In 1911 another concern for the production of this copper was established in the Urals, with an output of about 7,000 tons. At present all domestic requirements of electrolytic copper can be met with copper of Russian origin.

DIAMOND TOOLS

A Brief Article Describing the Use of Rough Diamonds for Metal Grinding Purposes.

By W. H. Parry.*

It was but a very few years ago that the use of diamond tools was restricted to concerns who could stand the strain of the high prices charged for them. Today things are different, in that many manufacturers are now in a position to make their own tools and avoid, in a great measure, paying the large profits that were wont to go into the pockets of the makers of diamond tools, who charged pretty much what they pleased for them. Now that the use of this class of tools is general in the brass and hard rubber industries, and for the benefit of the readers of The Metal Industry who are not using them for fear of the expense attached thereto, we propose to tell a few of the inside facts connected with the making of these tools, starting with the selection of the "bortz" and winding up with the finished tool and what it can do.

In the vicinity of Maiden Lane and John street, New York City, can be found many diamond merchants who make a specialty of selling diamonds for use in the mechanical arts, and it may be well, at this stage of the game, to warn intending purchasers of the wiles practiced by these selfsame merchants whose actions ought to be sufficient in itself to place on guard anybody coming in contact with them, as the art of "slipping one over" on a "greenhorn," or an "old-timer" for that matter, is practiced in the diamond industry to the "queen's taste."

In selecting "stones" or "bortz" the use of a jeweler's eyeglass is necessary, unless one is possessed of second sight, as without the use of this instrument many defects such as carbon spots, knots, seams, cracks, and cross grains are not apt to be located, and the more free the stones are of these imperfections, the better for mechanical purposes. But it must be borne in mind that a stone free from defects of any kind is indeed a rarity, and when what are known as "white" stones are only slightly defective they are never offered for sale for mechanical purposes, as they are too valuable for such use, being in great demand for making brilliants and gems. Thus it follows, that the only good stones offered from which to make lathe and planer tools are almost invariably "off" color, being mostly brown, yellow, gray and mixed in color. At least this is true of the South African stones. Those coming from Australia are usually white and yellow, and also too small in size to be shaped effectively for mechanical uses.

In selecting stones it is advisable to look over a large lot or package containing from 500 to 1,000 carats, as the forces of nature in forming these stones did not in many cases cling to the octahedron shape so prevalent in many stones, and it is possible to get stones more closely conforming to the desired shape of lathe or planer tool by having a large lot to look over. The object is also to select a stone that loses as little as possible of its weight when being manipulated by the lapidary, or "diamond polisher" as they prefer to be called. Though for the life of me why they should be called polishers is a mystery, as the process is one of grinding, not polishing, which we will explain later.

Having selected the stones the next step in order is to blow yourself off to crushed "bortz," or diamond splints, say ten carats for a starter. The price varies from eighty cents to a dollar and a quarter a carat, while the stones that weigh from one to three carats can be bought for six to eight dollars a carat. Very well, you have now the diamonds and the grinding material and all you need is the mechanical equipment, which we might state places you in about the same class as the "piker" who found a yachting cap and declared that *all* he needed then to make him happy was a steam yacht with a crew of a hundred men. The most important part of the equipment is the "wheel," which is a cast gray iron disk 11 in. to 12 in. diameter, mounted on a shaft and rotating in a horizontal plane at from 2,000 to 2,500 revolutions per minute. The ends of the shaft are pointed and run in wooden blocks, usually lignum-vitae, one below the table and one above, it being understood, of course, that the shaft is running in a vertical position. These wheels, as stated before, are made of gray iron and most of them are manufactured in Antwerp and Amsterdam; and you will be told that they are made of a metal the ingredients of which is a very precious secret, known only to the makers. As a matter of fact it is just ordinary cast gray iron with an open grain so that the minute particles of diamond dust can lodge there while performing the function of grinding the larger diamond.

On the back of these wheels are cast some mysterious hieroglyphics including a beautiful dragon (or is it a mule?), which is undoubtedly placed there to impress the user with the perversity of diamonds, as symbolized by either one or the other animals in bas-relief. The next step is the purchase of a couple of "tongs"—though they do not in the least resemble tongs as we know them. These are used to grip the copper handle of the cups, that in turn contain the solder in which the diamonds are enveloped. These "tongs" are made of steel and wood and are of such crude design as to create laughter, yet as they were made that way in Holland and Belgium a century ago it would be a sacrilege to modernize them in any way. So we will consider that everything is complete so far as the mechanical equipment is concerned and we will go a step further and insist upon the purchase of a mortar and pestle. Not exactly the class the druggists use, but just a piece of wrought iron or steel, say two or two and a half inches in diameter and the same height, with a 5/8-in. hole drilled in the center into which is fitted loosely a pin or pestle of a length twice the depth of the hole. This pestle and mortar are used to pulverize the "crushing bortz" or "diamond splints." While it may appear that diamonds are much harder than steel or wrought iron it will be found that they will pulverize easily by placing a small quantity in the bottom of the mortar, placing the pestle on top of same and by a series of short sharp blows on the top of the pestle pulverized diamond dust will result, and this mixed with five drops of olive oil to every carat will give you a paste, that when smeared on the wheel will cut or polish your diamonds to any shape that you desire, thus verifying the old adage of "diamond cut diamond."

Once having shaped your stone to either square, acute angled or round nose, the next step in the proceedings is to place the stone in the steel holder, which in turn is fastened in the tool post of the lathe or clapper box of the planer. This is done by taking steel rod stock (cold rolled will do) of any size suitable to hold your stone, and drilling a hole in the end to about the depth of it, and large enough for the stone to fall in. Then hacksaw across the hole in two or three places, to the depth of the hole; this will give you flexible points to bend over the stone when placed in proper position and holds it when you are soldering the stone in place, which is done with granulated brass solder and a blow pipe. After the soldering operation it is only necessary to remove the

*Superintendent, National Meter Company, Brooklyn, N. Y.

surplus solder and steel, taking care to leave enough of both to hold the stone while being subjected to the thrust of the cut on either lathe or planer. And, if you are wise, you will see to it that the largest part of the stone is covered with solder, thus forming a "dovetail" and materially helping to keep it in place under stress.

It may be asked by some skeptics, "why use diamonds?" and the answer is, that in turning hard rubber they are the only tools that will stand up to the work. The writer has come into intimate contact with jobs where the tool once set did not need sharpening for over six months. These particular jobs were on hard rubber, and if there is any material that steel, and high speed steel at that, will not work successfully, it is hard rubber; so that no matter what the diamonds cost in the raw and no matter what they cost to polish and set up, it is the best of economy to use them on hard rubber. The same can be said of bronze, where a mirror finish is desired, though we would not recommend them at all for "roughing" or "hogging" operations. Yet we know of South American carbon diamonds that are used on the coarsest kind of work in any metal or any material, but as we started out to tell of "bortz" only, we will have to confine ourselves to them and let somebody else do the "snitching" on the use that South American black carbons can be put to.

It is hardly worth mentioning about the use of diamond bortz for dressing emery wheels, as it is generally known, but if you follow the "dope" as set forth here you will be able to insert the stone in the holder yourself without the expense of letting some outsider do it for you. And if you will bear in mind that stones used for emery wheel dressing purposes need not be shaped at all, but just soldered in the holder, you will save some more money and perhaps be able to take an occasional trip to Coney Island and indulge in one or two of "Feltman's" "hot dogs" on the side. The next day those self-same "dogs" will feel as heavy on your stomach as the lead weights that are used by all diamond polishers to weight down their "tongs" while the same are placed in position around the "wheel."

THE FILTERING, AGITATING AND HEATING OF NICKEL PLATING SOLUTIONS

By Franklin W. Hobbs.*

Every nickel plater has experienced the many disadvantages due to the yellow mud (iron) which accumulates at the bottom of the tank, more or less of which permeates the entire solution, especially if a piece of work happens to be dropped in the tank or the solution is in any way agitated. This sediment deposits upon the work, causing a roughness which requires more labor and the consumption of more polish and buffs to produce a color than would be required if the sediment were not present. A deposit so rough as to require an undue amount of buffing, though it may have been brought to a fairly satisfactory color, is so reduced in thickness as to be of inferior wearing qualities.

The agitation of a nickel plating solution would be a decided advantage, because a stronger current could be employed, thereby reducing the time required to secure a deposit of the required thickness, but this cannot be done while the sediment is present to any extent. I remember reading a few years ago of one firm who had found it to their advantage to "take the bull by the horns" and filter their solutions once a week, so that they might agitate them without fear of the unsatisfactory results due to the presence of the sediment.

During the winter months the temperature of the solution generally drops below what it should be to get the best results; this is frequently remedied by introducing steam pipes into the tank. I will endeavor to describe an arrangement, shown in the sketch, which I have found to give very satisfactory results in several months' use.

A small power pump is located at some convenient place near the end of the tank, the suction pipe is of lead, and runs down inside end of tank and extends along the entire length of the bottom, the end is closed up and small holes are bored along the sides of that part of the pipe which is at the bottom of the tank. A box made of thin wood, open at intervals along the sides, so as not to interfere with the suction, serves to protect the pipe against injury in case of pieces of work or anodes dropping. The delivery pipe from the pump is attached by a piece of rubber hose to a U-shaped pipe which is immersed in a hot water caldron. Another piece of hose is connected to the opposite side of the heating coil and extends to a felt filter bag. The filter bag is suspended in a small tank or other suitable receptacle so situated as to have its bottom slightly higher than the top of plating tank. A pipe from the bottom of this smaller tank extends to a narrow trough which goes the length of the plating tank just above the surface of the solution.

The solution is raised from the bottom of the tank, forced through the pipe which is immersed in hot water, thence to the filter bag, passing through this to the small tank and by way of the pipe to the trough,

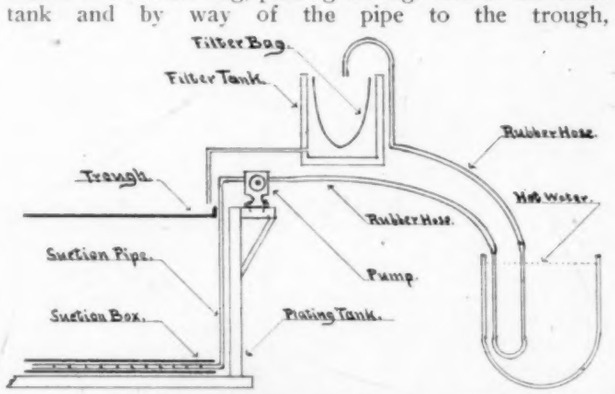


DIAGRAM OF SCHEME FOR FILTERING AND HEATING PLATING SOLUTIONS.

where it is distributed the length of the plating tank through small holes in the bottom of the trough The tank containing the filter bag need be only slightly larger than the bag. Should the bag become clogged so as not to filter as fast as the pump delivers, the solution will run over the top of the bag into the tank, so that there is no harm done; ordinarily it will not run over if washed out once a day.

It is readily seen that this system accomplishes several desirable things at one and the same time; it filters the solution, agitates it, raises the lower or richer strata to the top and constantly mixes it so that it is of uniform density at all points. The solution being constantly in motion tends to dislodge gas bubbles and allows of a stronger current being used, thus producing a smoother deposit in a shorter space of time. Last but not least, the heating feature is very desirable, and the temperature can be controlled within very close limits by raising or lowering the pipe in the hot water, immersing more or less of it according as the needs require.

*Foreman Plater, Wood & Bishop Company, Bangor, Me.

THE DETERMINATION OF NICKEL BY THE USE OF DIMETHYLGLYOXIME

DESCRIPTION OF A RAPID METHOD FOR THE ESTIMATION OF NICKEL IN CHEMICAL SOLUTIONS AND ALLOYS.

BY PERCY S. BROWN.*

The author's attention was first directed to dimethylglyoxime as a means of separating nickel and cobalt, by a paper written by O. Brunck[1] in 1907. In this paper Brunck gives credit to Tschugaeff for suggesting dimethylglyoxime as a means of detecting the presence of nickel and then explains the results of his investigations into the value of the reagent as a means for the quantitative determination of nickel. When this method was first proposed it had one fault, namely the high cost of the dimethylglyoxime, but recent experiments have shown that the method is of great value and with its application now almost universal, has come a reduction in the cost of the reagent that places the new method at the command of anyone who wishes to use it. In October, 1907, Brunck[2] gave further information about the use of dimethylglyoxime and showed that by the use of a Gooch crucible he could get extremely accurate results. His article further elaborated the method and showed how it could be applied to the determination of nickel in the presence of cobalt, zinc, manganese, iron, aluminum and chromium. Brunck, in the aforementioned article, calls attention to the fact that the nickel can be determined in either a dilute or strongly concentrated solution, and suggests the use of a 1 per cent. alcoholic solution of the dimethylglyoxime. A slight excess secures complete precipitation but theoretically four parts of the reagent are required to precipitate one part of nickel. The nickel solution which usually contains free acid should be heated in a beaker nearly to boiling and the reagent added. Then ammonia is added drop by drop until the solution smells faintly of the ammonia. Filter through a Gooch crucible using suction.

Brunck's methods for the separation of nickel from other metals follow:

SEPARATION OF NICKEL FROM COBALT.

One-half gram of the sample is dissolved in HCl (or if a salt it is dissolved in water) and the solution evaporated nearly to dryness. After diluting to 400 cc. with water add .2 gram of dimethylglyoxime and 2 grams of sodium acetate. Filter after allowing to stand one-half hour.

SEPARATION OF NICKEL AND MANGANESE.

Use sodium acetate to neutralize the acids instead of ammonia.

NICKEL AND ZINC.

Use either ammonia or acetic acid but preferably the latter.

NICKEL AND IRON.

To the solution containing iron, in the ferric state, tartaric acid is added before precipitation, to prevent the subsequent formation of ferric hydroxide on adding ammonia.

NICKEL AND ALUMINUM.

The method is similar to that used for nickel and iron.

NICKEL AND CHROMIUM.

Tartaric acid is added to prevent the precipitation of chromium by the ammonia but it is also necessary to have a sufficient amount of ammonium chloride present.

NICKEL IN SALTS USED FOR ELECTRO-PLATING.

Take .3 gram of the material and dissolve in 150 cc. of water in a 250 cc. beaker. Make slightly alkaline by adding ammonia drop by drop from a burette, then bring nearly to a boil and add 40 cc. of a 1 per cent. solution of dimethylglyoxime in alcohol. Then add ammonia until the liquid smells strongly of it and filter through a weighed Gooch crucible and dry in the oven at 110 degs. to 120 degs. C., to a constant weight. The factor is .20365.

In later experiments Brunck[3] showed the value of the dimethylglyoxime method in determining nickel in nickel steel. H. Wdowiszewski[4] in his experiments states that it is not necessary to use a Neubauer or Gooch crucible in drying the precipitate but that accurate results may be obtained by folding the wet filter containing the precipitate and enclosing it in another wet filter, then incinerating the filters slowly in either a porcelain or platinum crucible. The advantages of this method are doubtful as the Gooch crucible offers a rapid, easily controlled method of procedure. E. L. Rhead[5] found that the dimethylglyoxime method gave satisfactory results in determining nickel in nickel steel. P. Bogoluboff[6] found that the nickel-oxime precipitate could be conveniently treated as suggested by Wdowiszewski.

La V. W. Spring[7] gives the following method for determining nickel and zinc in German silver and other alloys. Tin is first removed from a weighed portion of the alloy by nitric acid, lead is removed as sulphate, copper by electrolysis and iron by the usual method (ammonia). Five grams of ammonium chloride are then added to the solution, the solution is exactly neutralized with HCl and dimethylglyoxime is added. Ammonia is then added drop by drop until the liquid smells slightly ammoniacal. The solution is then heated and held just below the boiling point for one-half hour and is filtered through counterpoised filters or through a Gooch crucible and the precipitate of nickel glyoxime is washed with hot water and dried at 105 degs. C. to a constant weight. The filtrate is made just acid with HCl and 10 cc. excess of acid are added. The filtrate is then boiled for about ten minutes to decompose the excess of dimethylglyoxime used and 10 grams of microcosmic salt are added, followed by exact neutralization with ammonia and hydrochloric or acetic acid. The solution is then heated just below the boiling point until the precipitate becomes granular. The beaker is then removed and the precipitate filtered off under suction. The precipitate is washed with hot water, ignited in a porcelain crucible and weighed as zinc pyrophosphate.

Spring further states that if the solution contains sufficient tartaric acid the nickel can be precipitated by dimethylglyoxime in the presence of iron, aluminum and chromium. Experiments made by S. W. Parr and J. M. Lindgren[8] confirm Spring's experiments in regard to the precipitation of nickel in the presence of iron, aluminum and chromium. The value of the method is immediately obvious to anyone who has had experience in determining nickel in either ferrous or non-ferrous alloys. An interesting paper by F. Ibbotson[9] has recently contrib-

*Expert Electro Chemist, New York.
[1]Z. angew. Chem., 1907, 20, 834.
[2]Z. angew. Chem., 1907, 20, 1844-1850.
[3]Stahl u. Eisen, 1908, 28, 331-333.
[4]Stahl u. Eisen, 1908, 28, 984-988.
[5]Analyst, 1910, 35, 97-103.
[6]Stahl u. Eisen, 1910, 30, 458-459.
[7]J. Ind. Eng. Chem., 1911, 3, 255-256.
[8]Trans. Amer. Brass Founders' Assoc., 1911, 5, 120-124.
[9]Chem. News, 1911, 104, 224.

uted knowledge of value, as he found that instead of weighing the precipitate after washing with hot water and drying at 105 degs. C., it is better to wash with water containing ammonium nitrate and then to ignite to nickel oxide. The ammonium nitrate solution is suggested as it prevents any tendency for the precipitate to pass through the filter. Ignition may be done without loss if care is taken first to char the paper without allowing it to take fire. Nickel may be determined in German silver without first separating the copper by the following method:

Dissolve .5 gram of the German silver in 10 cc. of nitric acid. Dilute to 400 cc., add 2 to 3 decigrams of tartaric acid and then an excess of ammonia. Heat the solution to 50 degs. C., add an excess of the dimethylglyoxime and allow the solution to stand in a warm place for a few minutes. Filter the precipitate and wash with hot water containing ammonium nitrate until the washings are colorless. The precipitate is then dissolved in a little dilute nitric acid and reprecipitated, as it still contains a little copper. The solution is filtered and then removed in the wet filter paper, enclosed in another wet paper and placed in a crucible, heated carefully until the papers are thoroughly charred, and the temperature is then raised slowly and ignition completed at a red heat. The contents of the crucible is calculated as nickel oxide.

Brunck's work has been somewhat modified by recent investigators, but in the main can be closely followed. It will be noted from the above that most of the investigators subsequent to Brunck have merely confirmed the accuracy of the method or suggested minor modifications of it. The author has never investigated the method suggested by Ibbotson, but can see no disadvantages in it if the operator follows directions and is careful to avoid loss through too rapid ignition. The Gooch crucible method is of such undoubted value and so simple of operation that it recommends itself to the average chemist. Messrs. Catlett and Weiberg, who were formerly associated with the author, conducted many experiments with the dimethylglyoxime method, principally in determining the nickel in nickel salts and in electro-deposited nickel on both ferrous and non-ferrous alloys. The method of determining the nickel in nickel salts has been given above, but I am under the impression that no method for rapidly determining the nickel on electroplated parts has ever been published. Such a method is of such undoubted value that it is advisable to cover it in this article.

THE DETERMINATION OF NICKEL ELECTRO-DEPOSITED ON OTHER METALS.

NICKEL ON BRASS OR COPPER.

The nickel plated part is first carefully cleaned and then dipped in a bath of melted beeswax and then withdrawn and allowed to cool. A square or circular piece of the wax is then removed by some suitable means. This exposed metal must, however, be of known area. If desired, a number of places may be exposed on the same part in order to obtain an average of the surface. Strong nitric acid is now dropped on the exposed nickel surface and after a slight interval is washed into a beaker, this operation being continued until the nickel is completely removed from the exposed portion of the piece. The beaker now contains a nitric acid solution of the nickel from a known area of the part, together with some copper, or copper and zinc, as the case may be. The solution is now made ammoniacal and warmed, and an excess of dimethylglyoxime added. The red nickel glyoxime forms quickly and is filtered off through a Gooch crucible by suction, the copper and zinc passing through into the filtrate. The precipitate is then dried and weighed. The weight of nickel and the area from which it was removed now being known it is a simple matter to calculate the weight of nickel per square inch of the part under test or to calculate the total area of the part under test and figure the weight of nickel on the entire part. If the latter basis is used I would suggest dissolving nickel from more than two places on the part and thus obtaining an average, as there is great variation in the amount of nickel on any surface on which nickel is electro-deposited.

NICKEL ON GERMAN SILVER, ETC.

The same methods should be followed as for brass up to the point where the ammonia is added. At this point the same methods should be followed as above described for nickel in German silver.

NICKEL ON IRON OR STEEL.

The precipitation of the iron can be prevented by the addition of tartaric acid prior to adding the ammonia, in all other respects the method is the same as in determining nickel on brass or copper.

The above described method for determining nickel on parts that have been electroplated is so simple in operation that it does not require a chemist to operate it. The method is rapid, as a Gooch crucible can be prepared in a very few minutes by washing the asbestos with alcohol, then with ether and then applying suction to remove the excess of alcohol and ether and then igniting and heating up over a Bunsen burner. A great many determinations can be run by one operator in a day and the results are accurate.

It is interesting to note that the dimethylglyoxime will detect nickel in a solution containing less than 1 part to 400,000 parts of water. The dimethylglyoxime may be recovered from the nickel precipitate by carefully washing it and then breaking up the crystals, warming with potassium cyanide until all is dissolved, filtering through a falten filter and making acid with acetic acid. If pure the crystals will be white in color, and if not they will have a reddish tinge. In the latter case the crystals should be recrystallized from alcohol with some charcoal present. Crystals should be dried carefully in any satisfactory manner and can then be used for further determinations. At the present time it will be found that the cost of the dimethylglyoxime has been so materially reduced that the reclaiming of the glyoxime is hardly advisable.

To the operator who desires to obtain a rapid, accurate method for determining nickel in alloys, solutions, salts, etc., the dimethylglyoxime method offers the best means now available.

IMITATING SILVER.

In the manufacture of "art" articles of white sheet metal it has long been the custom with some manufacturers to imitate real cast ware by forming the articles in so-called sheet tin—that is, of tinned sheet iron or steel—and then retinning the formed article, after which it is given a final pressing. Any small cracks or other defects in the pressed sheet are covered by the second tinning, so that by the final pressing very fine designs may be successfully employed.

A recent improvement on this process, or development thereof, consists in imitating old silver. The process employed goes about the matter in exactly the opposite manner from the usual—as instead of endeavoring to get the sheet tin as smooth as possible, in the original rolling, so as to prevent its taking on an excessive quantity of tin in the bath, it is purposely rolled rough or grained, and then by a special process tinned or copper-plated very thin so that the grained surface remains. ROBT. GRIMSHAW.

INTERESTING INFORMATION GLEANED FROM UNITED STATES GEOLOGICAL SURVEY REPORTS

NEW APPLICATION OF ALUMINUM AND CONSERVATION OF OUR METALLIC WEALTH.

RECENT APPLICATIONS OF METALLIC ALUMINUM.

A pamphlet, prepared by W. C. Phalm, of the United States Geological Survey, Washington, D. C., on the Production of Bauxite and Aluminum in 1912, gives the following interesting facts:

A recently developed branch of the aluminum industry is the manufacture of the powdered metal, known to the trade as aluminum-bronze powder, and used extensively as a paint pigment, in explosives, in lithographing and in printing. To make the powder, foil made of the metal with a thickness of only 0.01 millimeter (0.0004 inch) is cut into squares of 2 millimeters, or 0.079 inch, on a side and rubbed to powder. The material feels like powdered graphite and is just as difficult to remove from the skin.

Aluminum foil, though not exactly a new product, is now being used on a larger scale than ever before, owing to improved methods in the making, after long and expensive experiments, which have lowered its cost appreciably. The rolling is reported to be effected in six stages, the last of which yields a foil 0.04 millimeter (0.0016 inch) in thickness. In order to get a thinner foil several sheets are laid together and either rolled or beaten like gold leaf. Aluminum foil has partly displaced tin foil for wrapping articles such as cheese, chocolate, candies, tobacco, etc. Aluminum foil is also reported to be used in the manufacture of electrical condensers.

The employment of metallic aluminum in the manufacture of cooking utensils and other articles of domestic use has been referred to in Mineral Resources in previous years. The use of the metal is now being extended on a much larger scale in the construction of tanks, cooking vats and vessels which are employed by brewers, preserve manufacturers, and in similar industries where heat conduction, non-corrosion and a non-poisonous nature are essential. It is reported that an addition has been built to the cooking utensil factory of the Aluminum Company of America, located at New Kensington, Pa.

The expansion in the use of extruded forms and tubing has been great during the last few years. The difficulties encountered in making extruded shapes have been largely surmounted, and they are now being turned out with high tensile strength and with very compact structure in almost any form called for. The use of aluminum tubing outlined in the report for 1910 has also been expanding, and an extension to the tubing plant of the Aluminum Company of America at New Kensington, Pa., is reported.

The use of aluminum wire as the conductor in long distance power-transmission schemes is not new, but recent departures from the ordinary practice bid fair to enlarge this application of aluminum. It is reported that there has been placed upon the market a steel-reenforced aluminum cable consisting in all of seven strands. The six outer strands are made of aluminum, and the inner strand is made of steel of very high tensile strength. It is claimed for this conductor that it both transmits the current and has the requisite strength for use in the towers which are rapidly displacing poles in transmission lines. The Pacific Light & Power Company, of Los Angeles, has adopted this product for its new transmission line which is to carry power to Los Angeles over a distance of 275 miles.

The employment of metallic aluminum in the manufacture of articles of everyday use has become so common that such articles fail to attract attention as novelties. The demand at the present time in this direction seems to be for skillful originality in designing new forms and applications.

METAL CONSERVATION.

According to a recent report issued by the United States Geological Survey the value of the "secondary metals," exclusive of gold, silver, platinum, iron and aluminum, recovered in 1912 reached the enormous total of $77,395,843, compared with $52,585,390 in 1911.

"Secondary metals" are lead, copper, zinc, tin and antimony recovered from scrap metal, sweepings, skimmings, drosses, etc., and are so called to distinguish them from the metals derived from ore, which are termed, "primary metals."

The reports do not include the very large quantity of old iron and steel remelted, neither do they include the precious metals.

These secondary metals displace an equivalent quantity of primary metals and must be considered in any estimate of stocks available for consumption in any year.

The total amount of secondary copper recovered was 137,507 tons, of which 14,541 tons were recovered by plants refining primary metals and the remainder by plants treating only secondary materials.

The production of copper from secondary sources in 1912 was equal to 17.5 per cent. of the smelter output of primary copper in the United States from all sources, or 22.3 per cent. of the primary copper smelted from domestic ores.

The secondary lead recovered amounted to 67,168 tons, or about 13,000 tons more than in 1910. The recovery of lead in alloys was very large, increasing over 10,000 tons compared with 1911.

The output of secondary zinc (including that in brass) amounted to 81,543 tons and equaled 24.1 per cent. of the total production of primary spelter in the United States in 1912.

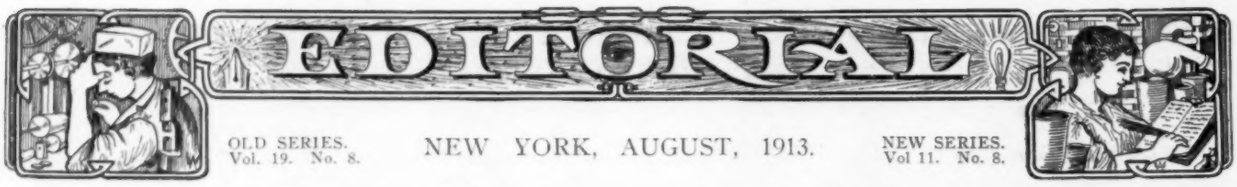
The production of secondary antimony, of which all but 13 tons was recovered in alloys, increased from 2,369 short tons in 1911 to 2,506 tons in 1912. The 1912 imports of antimony as metal, in ore, or oxide amounted to 8,685 tons, and the recovery from secondary sources was equal to 29 per cent. of such imports.

There were no domestic tin ores smelted in the United States in 1912, though some tin concentrates were shipped from Alaska to Great Britain for treatment and a small quantity of foreign tin ore was smelted in New York.

The secondary tin recovered in 1912 was equal to 26.6 per cent. of the tin, as metal or as oxide, imported into the United States during the year. Secondary tin recoveries increased from 14,706 short tons, in 1911, to 15,401 tons valued at $14,301,368, in 1912.

GERMAN MACHINE-TOOL INDUSTRY.

The report just issued by the Union of German Machine-Tool Manufacturers states that its members have shared in the general trade activity. Exports continue to increase, the total last year being 77,000 tons, against 64,500 tons in the previous 12 months. Imports also show an increase, and this is asserted to be due chiefly to the lowness of German import duties on machine tools.



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THE METAL INDUSTRY

With Which are Incorporated
THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS

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CONTENTS

NEW LEAD COPPER TIN ALLOYS

Readers of THE METAL INDUSTRY who followed the discussion on "The Patent Situation Regarding Bearing Metals in the United States," which ran through the columns of this paper for four years (1909-1910-1911-1912) will be interested to know of the latest developments in the art of alloying metals.

Edward D. Gleason, of New York, has just been granted two patents, numbers 1,066,403 and 1,066,428, dated July 1, 1913, for copper—lead and copper, lead and tin alloys. Mr. Gleason overcomes the dreaded lead sweat and segregation of tin by the use of boron. Unfortunately the method employed by Mr. Gleason to incorporate the boron into the copper is not given here, but is the subject of another application, No. 731,863, for a United States patent. Hence we must be patient and in the meantime surmise that it is boron SUB-OXIDE that is used. This substance as has been described in THE METAL INDUSTRY (November, 1912 and February, 1913) is coming into quite large use for the production of sound copper castings.

A patent number, 1,067,727, June 24, 1913, has just been issued and is described under the head of "Patents in this issue of THE METAL INDUSTRY, which covers the use of boron TRI-OXIDE. Just what the chemical difference between the SUB and TRI-OXIDE is has not been explained and is a matter for the experts to figure out, but the metallurgical significance appears to be the same they both, or the one compound under two names, have apparently the same effect on copper and copper compounds, i. e., reduce copper oxide or prevent its formation. In Mr. Gleason's discovery another function seems to be played equally as important as the deoxidizing one, that is the prevention of lead sweat and tin segregation. This is a most interesting development and one which we should like to see discussed by some of our prominent metallurgists.

Mr. Gleason says under the head of his patent, No. 1,066,403:

"In practising my invention, I incorporate boron in copper, as graphite exists in cast iron; such a boron copper product and a method of producing it being the subject matter of another application Serial 731,863, filed November 16, 1912, for Letters Patent of the United States. Such boron copper is harder than ordinary copper and by its employment in varying percentages I am able to make copper-lead alloys which are alike in total percentage of copper but different in degrees of hardness. For instance, an alloy in accordance with my invention may contain 50 parts lead and 50 parts of boron copper and would be much harder and more brittle than another alloy, in accordance with my invention, containing 50 parts lead and 50 parts of copper if the latter is an aggregate of ordinary copper and boron copper. In any case, I prefer to proceed by first melting the copper, with

suitable appliances, and adding the lead thereto when the copper is in the fluid state, and, then stirring or otherwise agitating the mixture before pouring it into ingot molds.

For instance, I take 50 parts of boron copper, melt it and add thereto 50 parts of lead. The alloy thus produced may be called No. 1. In making another alloy I take 50 parts of ordinary commercial copper, melt it, add 50 parts of lead and then add 100 parts of "No. 1." This may be called No. 2 product and is less hard than "No. 1." In making another alloy I melt 50 parts of commercial copper and 50 parts lead as in the above procedure and add thereto 100 parts of "No. 2," this product being, of course, less hard than the two previous examples. All of these products are free from lead sweats or segregation and have an unctuous anti-frictional texture and a surface resembling planished copper; properties which are advantageous in bearings, piston rings, gaskets and steam packing.

"In making alloys of copper, lead and tin, the tin will segregate if not in the proper proportion for the copper and lead. For instance, if copper 67 parts, lead 24 parts and tin 9 parts are mixed in accordance with ordinary foundry practice, the lead will sweat out and form in little pools and the tin will segregate and stratify. On the contrary, by the employment of boron copper as above contemplated such alloys of copper, lead and tin may be made entirely homogeneous and of any desired degree of hardness. For instance, an alloy, in accordance with my invention containing 80 parts lead, 19¾ parts boron copper and ¼ part antimony, will fuse in an ordinary iron hand ladle at about 900 degrees F., but is tough, hard and equal to a so-called 'Babbitt metal.' This alloy is well adapted for the manufacture of die castings, viz., castings made under pressure."

Patent number 1,066,428 is similar in intent and covers the claim for lead copper, boron and tin.

SILVER SOLUTION

To the Editor of The Metal Industry:

I read with much interest the article on "The Silver Solution," by S. Shoeld and G. B. Hogaboom, in the July number of The Metal Industry, wherein is given a lot of figures to show that a volt meter is preferable to an ammeter if only one instrument is available. While I agree with them on the other features of the article, they contradict themselves by saying that you would have to calculate the area of each batch of work; and in another place they state that the anode surface is seldom changed to meet any difference of cathode surface, the tank is generally run to its fullest capacity and therefore the anode and the cathode surface are approximately equal.

Now I have worked with an ammeter for about 25 years and have also used a volt meter for 15 years, but very seldom use it as the ammeter generally tells me what I wish to know. I would like to ask how they arrived at the conclusion that one volt was the right pressure to use. I guess I arrived at the amperage to use the same way, and, as the tank is generally run full, the same number of amperes will do the same work, but when the tank is not full, then the ammeter is on the job, as, for instance: If the tank is full and you have, say, 10 pieces of work and 20 amperes current, then one piece will plate equally well with two amperes regardless of the fact that the resistance has changed. I will, of course, concede that you generally (in a silver solution) take out anodes when reducing your work, but in other solutions you generally do not, and the same voltage would not do.

I have done silver plating by weight for years with an ammeter alone and as you generally have the same work I had a chart of amperes to use on all work, and if it did not plate right at that current I knew that something was wrong, the same as you do when the work does not come out right at one volt.

As the volt meter (on a silver solution) may be a little easier to use for a beginner, I think the ammeter is the best instrument as it tells you all that the volt meter does and by just watching your anodes you can see if your current is too high or too low instead of calculating the area of your work. Besides you can tell how much silver is depositing in a given time, as your solution is not right if it does not deposit 62½ grains of silver per ampere hour.

Now I wish to state right here that I wish the gentlemen to come back at me if I am wrong, as I am not too old to learn and to say the least I am some times wavering in my position, thinking it is a matter of how you get started.

I herewith give an experiment on a small lot of silver plating which will be of interest to volt meter users. This experiment was made on a small lot, about 50 square inches of surface, which I considered should be plated at about 1½ amperes. Now the following readings are what I got, 1 volt 1 5/10 amperes with 1 anode, 1⅗ volts 1 4/10 amperes with 2 anodes, 1 volt 1 ampere with 1 anode. The first two readings were obtained without changing rheostat, by simply doubling anode surface. The last reading was obtained by changing rheostat so as to get the voltage back to one volt with two anodes, as these anodes contained about 20 square inches of surface and I considered two necessary. Now assuming you had only the volt meter, which one volt was right the first or the last or how would you ever know such a state of things could exist? Well I plated the work on 1⅗ volts and 1 4/10 amperes and it burnished and buffed well. The solution contains about two ounces of silver per gallon and just enough cyanide to give the anode a fine crystal white on the solution side, and just a little gray in the center, on the tank or back side of anode.

H. J. Ter Doest.

Akron, Ohio, July 28, 1913.

HARDENING

To the Editor of The Metal Industry:

Please refer to inquiry No. 1833 under "Shop Problems," in your issue of July, 1913, regarding "Hardening." It seems that our friend J. L. J. is somewhat incorrect in his statement headed "Treatment No. 2," which reads as follows:

> "To be specified when maximum tensile strength is required. Quench from 840 degs. C. and draw at 500 degs. C."

It would have been very much better if he had said, "To be specified when maximum tensile strength, combined with suitable ductility and elongation is required." The piece in question would have had very much higher tensile strength if simply quenched from 840 degs. C. and not drawn, than quenched and drawn at 500 degs. C. The drawing at 500 degs. C. reduces the tensile strength and raises the ductility and elongation.

Seth G. Malby.

New York, July 11, 1913.

NEW BOOKS

"HISTORY OF THE E. I. DU PONT DE NEMOURS POWDER COMPANY." 1913. Size, 6¼ by 9½ inches. Bound in Fabrikoid manufactured by the company. Published by the Business America, New York.

This book which is entitled "A Century of Success" gives a complete history of the E. I. Du Pont De Nemours Powder Company and is divided up into seventeen chapters all of

which make very interesting reading. The history of the manufacture of gun powder is taken up and told in a very entertaining manner and a direct connection is made between the manufacture and uses of gun powder and other explosives and materials used in the brass finishing business as for instance, lacquer and other compounds. A full financial statement of the powder company is also given in the latter part of the work.

"LIQUID STEEL: ITS MANUFACTURE AND COST." By David Carnegie, assisted by Sidney C. Gladwyn. Size, 6½ by 9¾ inches. 520 pages, including index. Ten plates and 252 illustrations in the text. Bound in red cloth. Published by Longmans, Green & Company. Price, $7.50 net. For sale by THE METAL INDUSTRY.

This work, which gives a complete description of the manufacture of steel, is full of information and data of practical use to steel makers generally. Included among the contents of the work are: the analysis and costs of iron ores, pig irons, refractory materials, fluxes, ferro-alloys and fuels, all of which are conveniently arranged in tabular form for easy reference. There is also given the composition of charges for different classes of steel, with particulars of the finishing additions required; details of construction, arrangement and cost of furnaces and plant and methods of assembling steel works' costs and details concerning the value of labor and the costs of living in various industrial countries.

"SCIENCE OF BURNING LIQUID FUEL." By William Newton Best. 1913. Size, 6¼ by 9¼ inches. 160 pages with index. Numerous illustrations. Bound in red cloth. Published by W. N. Best, New York. Price, $2. For sale by THE METAL INDUSTRY.

This book is intended as a practical book for practical men and gives valuable information relating to the burning of liquid fuel in furnaces and shows the wide application that the author has given throughout an extensive career embracing twenty-five years of study in the scientific use of liquid fuel. The book is composed of eight chapters which cover the following subjects: Liquid Fuel, Its Origin, Production and Analysis, Atomization, Oil Systems, Refractory Material, Locomotive Equipment, Stationary and Marine Boilers, Ovens, Furnaces, and we believe will prove most valuable to those who are interested in the question of burning oil for fuel, a practice which is daily becoming more general and is proving itself to be the most effective and economical method for the obtaining of heat efficiency.

"ELECTRO-PLATING AND ANALYSIS OF SOLUTIONS." By H. H. Reama, New York. 1913. Size 4½ x 6¾ inches. Bound in black leather. 100 pages. 18 illustrations. Published by THE METAL INDUSTRY PRINT. For sale by H. H. Reama, 216 Sixth avenue, Brooklyn, N. Y.

This little book is as announced by the author a manual of information and instruction written for the benefit of the electro-plater and those interested in the art of electro-plating who wish to know something of the chemistry of electrolytic processes. The book is divided into what might be termed three sections. The first section contains definitions of electrical terms and descriptions of apparatus and materials used in the preparation for electro-plating of the various metals, a complete list of the various tables of weights and measures, metric equivalents and chemical reactions encountered in the plating industry.

The second portion of the book comprises formulae and directions for performing the various plating operations such as copper, brass, nickel, silver, and gold plating in all the various styles and finishes. There is also included in this section some information relating to lacquers, etc.

The third section of the work covers the chemical analysis of solutions and this particular part of the book should appeal to every electro-plater who desires to be familiar with the chemical reactions that take place in plating operations. The chemical matter is so worded as to be easily understood by anyone having a slight knowledge of chemistry of the elements, and this is the first time that matter of this kind has been published and presented in concrete form so as to be easily accessible to the hand of the worker in electro-plating. We feel quite sure that this little work will be received with considerable satisfaction, particularly by those who so far have been in the dark as to the composition and action of the solutions that they are working with.

TRANSACTIONS OF THE AMERICAN ELECTRO-CHEMICAL SOCIETY. Volume 23. 1913. Size 6 x 9¼ inches. 432 pages, including index. Numerous illustrations. Bound in cloth. Published by the American Electro-Chemical Society. Edited by J. W. Richards, Secretary.

The twenty-third volume of the proceedings of this progressive society is fully up to the standard set by the previous publications. A handsome half-tone photogravure of Dr. E. F. Roeber, the new president occupies the frontispiece of the work. The book itself is made up of a report of the twenty-third general meeting held at Atlantic City, N. J., April 3 to 5, 1913. This meeting was one of the most successful of the society and included a symposium on electro-plating at which attended a number of the members of the American Electro-Platers' Society, who took an active part in the discussion following the reading of the papers relating to electrodeposition.

"THE JOURNAL OF THE INSTITUTE OF METALS, VOLUME 9, NO. 1." 1913. Size, 6 by 8¾ inches. 333 pages, including index. Bound in cloth. Published by the Institute. Prepared by the secretary, G. Shaw Scott, M. Sc., London, England.

This book, the ninth volume of the proceedings of the Institute of Metals, contains a full report of the annual general meeting held at Storey's Gate, Westminster, S. W., London, England, in March, 1913. A good portion of this meeting was taken up by the resolutions passed, concerning the retiring officers and the presidential address of the new president, Professor A. K. Huntington. The book also contains papers presented at the meeting among which was one on the "History of Corrosion," by Arnold Philip and the discussion which took place on the same; "The Corrosion of Aluminum," by G. H. Bailey, with its discussion, and "The Microstructure of German Silver," by O. F. Hudson, and "Practical Heat Treatment of Admiralty Gun-Metal," by the Messrs. Primrose. A very complete obituary of Sir William Henry White, the first president of the Institute, is also included in this volume. The second section of the book contains very complete abstracts of papers from various trade journals relating to the non-ferrous metals and industries connected therewith. The third section of the work contains a classified list of the members of the Institute.

"GENERAL AND INDUSTRIAL CHEMISTRY." Organic. By Dr. Ettore Molinari. Translated from the Italian edition by Thomas H. Pope. Size, 7 by 10 inches. 770 pages, including index. 506 illustrations. Bound in cloth. Published by P. Blackiston's Son & Company, Philadelphia, Pa. Price, $6. For sale by THE METAL INDUSTRY.

This work, which is devoted to the organic compounds as distinguished from Volume 1, which covers the inorganic compounds, is divided into three parts. Number one gives the brief summary of the history of chemistry and those portions of physico-chemical theory which are necessary for the interpretation of chemical phenomena. Hence, this course of organic chemistry assumes in the reader a knowledge of the fundamental chemical laws and ideas, methods of determining molecular weights, etc. The second portion of the book is descriptive of Derivatives of Methane, such as saturated and unsaturated hydrocarbons, derivatives of alcohol, acids and other derivatives of oils, fats, waxes, candles and soaps. Part three treats of aromatic hydrocarbons, sulphonic acids, phenols, aromatic acids and the coloring matters which include all of the known dyes which are derived from organic substances such as petroleum, etc. Taking the work as a whole it stands as one of the most valuable books of reference in existence today for not only the manufacturers of chemicals, but also for any manufacturer who is interested in the organic preparations of materials which enter into his every-day business.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

THE METAL INDUSTRY has had so many inquiries in reference to shop problems that have been previously published that it is deemed advisable in future to number each question. Since the inception of the department of Shop Problems 1,835 questions and answers have been published, without taking account of the many answered direct and by mail.—Ed.

ALLOYING

1836.

Q.—Please give us a formula for a metal that can be used for parts working in a super-heated steam at a temperature of 400 degs.

A.—Monel metal has been used by some firms for superheat work, but it cannot be handled by the ordinary brass foundry, being really a steel casting proposition.

The following alloy might be tried:

Copper	83	parts
Tin	10	"
Nickel	5	"
Zinc	2	"

J. L. J.

BRONZING

1837.

Q.—Kindly advise how to remedy a bronze solution which plates all right on one side of the work but shows up brass on the other.

A.—From your remarks it would appear to us that your bronze solution is deficient in copper and lacks conductivity. We would suggest that to overcome the lack of conductivity that you add from one to two ounces of sodium bisulphite to each gallon of solution. If this addition overcomes your difficulty then it will not be necessary to make any further additions. If the deposit still continues to have the brassy nature then you will have to add copper dissolved in potassium cyanide. We would suggest that a very concentrated solution of copper be prepared and small additions be made at intervals until the color is correct. Many platers make a mistake in not maintaining their bronze solution constantly with copper. A bronze solution consisting of 90 parts copper and 10 of zinc gives very good results, but even more copper can be used successfully in an electro-plating solution.—C. H. P.

CASTING

1838.

Q.—I wish to make some small castings in pure copper to show a high electro conductivity. The castings are of such a character that it means casting the metal on to a solid piece of copper. In order to do this, very high temperatures are necessary, so as not to cool down metal as it is poured. At present I am using two of old sand, one of new sand and one to twenty-four parts of the above coal dust. Green sand molds are used, faced with plumago. The castings from this practice show signs of the metal searching with part of the sand grains fused on. This is detrimental to the castings, and I shall be glad of some advice or a suitable sand for the work. I might say suitable deoxiders are used, the trouble being, however, more a sand than a gas.

A.—While it is common practice to use coal dust with green sand molds for cast iron, coal dust should not be used when casting copper. Use all old sand and face with a good grade of Ceylon plumbago. If trouble is still experienced it will probably be found that the sand is full of mica or other easily fused material and the remedy will be to use a more refractory sand that is higher in silica.—J. L. J.

1839.

Q.—We are trying to make castings to be used for porcelain work and the face of the casting must not be touched after sand blasting and we cannot get a smooth face on the casting; we have tried facing the moulds with plumbago dust, charcoal dust, aluminum powder. Can you tell me the best facing powder to use and the best metal mixture and the best sand.

A.—The sand used in this country is No. O Albany for facing one-third Windsor Lock dried and pulverized and put through a No. 60 sieve and two-thirds of the Albany tub sand, mixing the two thoroughly together and roll and then put the whole through a No. 24 sieve and temper with water in which a hand full of salt has been dissolved. For double facing or print back use Windsor Lock thoroughly dried and shaken through a heavy canton flannel bag, reram the mold and skin dry.—W. J. R.

CLEANING

1840.

Q.—Can you give me a recipe for cleaning roof glass in workshops? The steam, oil and smoke is hard on to the glass and can only be scrapped off with a chisel or knife. It is in a similar state to glass in railway stations, only the deposit is harder. A few years ago a man came and cleaned the glass with a solution, by wiping over with a secret solution and swilling with water, when it came as clear as new glass, but I have not got the man's address. Perhaps you or your readers have a similar solution. I have obtained a little success by rubbing with paraffin oil and fine iron swarfe, but the process is too slow.

A.—The solution you refer to is probably a semi-concentrated solution of caustic soda. By applying this solution to the glass for a short time this will saponify the oil which has become like a gum. When this becomes sufficiently soft it can be washed away leaving the glass clean. To each gallon of water dissolve 1 to 2 lbs. of caustic soda, add this to the water slowly as considerable heat is generated when added to water. This solution should be applied with a mop or sponge and rubber gloves should be worn when cleaning with the solution as the material acts upon the skin very readily. When the glass is set in wooden frames it is advisable after the oil and dirt are removed to wash with an acid water to neutralize the alkali of the soda solution. This may be done by adding a half ounce of oil of vitriol to each gallon of water. Apply this with a second mop, then wash thoroughly afterward with water.—C. H. P.

CUTTING

1841.

Q.—We have been using high speed steel in the manufacture of some of our tools for cutting brass and have found same not satisfactory. It was recommended to us and the claim made that we could speed up our machines and increase our production.

A.—High speed steel can be run faster than carbon steel, but the results are not so satisfactory on brass. There is only one kind of bronze, Tobin Bronze, that high speed steel will give satisfactory results on compared to the carbon steel. I claim from experience that four sets of carbon dies for threading which would cost the same as two sets of high speed steel dies will last longer when used under proper conditions, and if run at a moderate speed will give a much better class of threads.—P. W. B.

FINISHING

1842.

Q.—Can you tell me how to obtain a pea or slate-green direct on brass, that will have a semi-bright surface or will take a polish. The sample I saw was a modern cast brass gas bracket and did not appear to be pigment on washing off.

A.—The finish you refer to is termed verde bronze, and to produce the same, the brass articles should be polished as usual, then the surface deadened with pumice stone and water, using a bristle or a wire brush. A worn brass wire scratch brush will answer the purpose, and this may be run by power at 750 to 1,000 r. p. m. After the surface is prepared, wash and immerse in the following solution, or apply with a painter's sash brush:

Water	1 gal.
Nitrate of Copper	4 ozs.
Chloride of Lime	4 "
Sal Ammoniac	4 "

The immersion should only be momentary; then remove and dry in the air. When the green formation is produced, stipple lightly with a nearly dry brush. To produce the variegated tones, when the surface is dry, lacquer in the usual manner and then apply a thin film of beeswax. This may be applied to a soft bristle brush or soft buff wheel and will give what is termed the egg shell finish. If you desire to produce the slate background, the articles must be previously copper-plated and oxidized with a liver of sulphur solution, using about two ounces of liver of sulphur to each gallon of water. After the black deposit is produced use the following formula in the same manner as previously described:

Warm water	1 gal.
Sulphate of Zinc	8 ozs.
Sal Ammoniac	4 "
Sulphate of Copper	2 "
Glycerine	½ "

Mix in the order given. Either formula should give the results desired.—C. H. P.

GALVANIZING

1843.

Q.—Please advise if there is anything that I could add to my electro-galvanizing solution that would plate in and form an alloy with the zinc, causing the coating to better resist the copper sulphate test and at the same time afford a better medium against corrosion.

A.—You cannot add any metal salt to your zinc bath to form an alloy. If you do not get a sufficiently heavy deposit to withstand the sulphate of copper test increase the density by adding more sulphate of zinc, 2 to 3 ounces per gallon; then add not less than two ounces of common salt to each gallon of the solution. This will increase the thickness of deposit and increase the conductivity of the bath.

It might be advisable to nickel plate your articles previous to galvanizing. This would add as a protection to the articles, if of iron, in the copper test.

To neutralize your sulphate of copper solution we suggest that you add 20 per cent. ammonia. If you use care in the addition you will obtain a neutral solution without any precipitation. If litmus paper test is not satisfactory use Congo paper, it is more sensitive.—C. H. P.

1844.

Q.—We are unable to get a white deposit on our electro-galvanized work. We are using a standard formula. Please advise.

A.—The trouble with your galvanizing solution appears to be lack of conductivity. We suggest that to overcome the difficulty you experience in getting a white deposit to add common salt to your solution in varying proportions. We suggest that you first add one ounce to each gallon of solution, if you find that this addition does not improve the bath then add 2 ounces, etc., up to 4 ounces per gallon. Common salt has been found a very excellent remedy to overcome such troubles as these. By internal decomposition the conductivity of a solution becomes destroyed unless this is maintained constantly. This will frequently occur in a nickel solution, even though there may be ample metal to do the work the results are dark and varying colored deposits. We would also suggest that to overcome the danger of an excess of acid in your solution from the picking operations that the articles be carefully washed and that you maintain a separate bath made up of 3 to 4 ounces of common soda to each gallon of water. The idea of this is that after the articles have been pickled and washed a moment's immersion in this soda solution will neutralize any slight excess of acid that may be in the pores of the metal. Rewash in clean cold water before immersion in the zinc bath.—C. H. P.

MOLDING

1845.

Q.—Can you tell me the method adapted for fine art molding. We have tried the following mixtures:

Copper	88	Copper	87½
Tin	10	Tin	10
Phosphor Copper	1½	Spelter	2
Lead	½	Lead	½

A.—For the finest quality of sand castings use the following mixtures:

STATUARY BRONZE.		NEEDLE BRONZE.	
Copper	90	Copper	84
Tin	7	Tin	8
Zinc	2½	Zinc	6
Lead	1	Lead	2

—W. J. R.

PITTING

1846.

Q.—Could you tell me what causes pitting on the bottom side of lead bronze castings and how to overcome it?

A.—The pitted spots to which you refer are due to the lead going into the sand. You should cut your gates rather thin and work sand as dry as possible.—J. L. J.

PLATING

1847.

Q.—Will you kindly give me the formula for electric plating steel on copper?

A.—We suggest that you dissolve from 8 to 12 ounces of double sulphate of iron and ammonia in each gallon of water and add to this solution 2 ounces of magnesium sulphate Use anodes of soft Norway iron. The current should be regulated so that a very great excess of hydrogen is not produced, otherwise the deposit might be full of small pin holes, due to the occluded hydrogen deposited on the surface of the articles. Some platers who deposit in steel use a very small amount of glycerine or molasses to their steel baths, which they claim gives very good results. We suggest, however, that you first make up a bath as previously stated and then if necessary make the other additions.—C. H. P.

SOLDERING

1848.

Q.—Will you kindly advise what percentage of metallic bismuth can be used in tinner's solders to advantage?

A.—Where a very fluid solder is required a mixture of lead, 1 part; tin, 1 part, and bismuth, 1 part, may be used. It has a melting point of 284 F., but is too expensive for ordinary use. The use of smaller amounts of bismuth than the above percentage is not advisable, as too little is gained in fluidity.—J. L. J.

THREADING

1849.

Q.—Has there been any standard adopted for Acme Threads with regard to depth?

A.—With the Acme Thread there is no standard number of threads for different diameters of stock as with the V, the U, SS and other standard threads. However, there is a recognized standard for the depth of thread according to the number of threads per inch.—P. W. B.

PATENTS

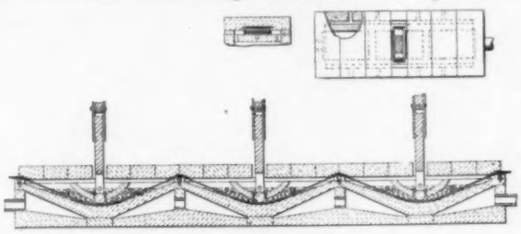
REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

1,065,727. June 24, 1913. **Method of Plating Metal.** W. S. Rockey and H. Eldridge, of New York, N. Y., assignors to Metallurgical Research Company, Arizona.

This invention relates to plating of metals by dipping of the metal to be plated beneath the surface of the plating metal when same is in a molten condition.

The object of the invention is to provide a method of plating a sheet of metal such as iron or steel in successive baths of the same metal or different metals to provide the base metal with a coating of laminated metals or to provide the said base metal with coatings, as shown in cut, of a single plating metal of different thicknesses to adapt it to the particular use for which it may be required.

A further object of the invention is to protect the plating metal or metals from being oxidized when exposed to the



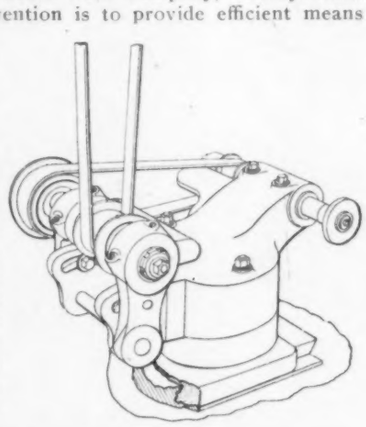
atmosphere in passing from one of said baths of metal to the next.

The patent covers:

The process of plating ferrous metal consisting in first passing the metal to be plated through a flux of boron trioxid into a bath of metal having a copper base which is maintained at a temperature near its melting point and then withdrawing the ferrous metal from said bath through a flux of boron trioxid to coat said plating with said flux, then carrying said metal into a second bath of plating metal which removes said flux from said plating and deposits a coating of plating metal on said first coating of plating metal and then withdrawing said metal plated article from said bath through a flux of boron trioxid to coat said plating metal with said flux to protect the plating during its cooling period.

1,066,167. July 1, 1913. **Grinding Machine.** C. G. Trefethen, Erie, Pa., assignor to Modern Tool Company, Pennsylvania.

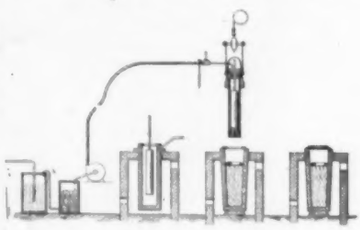
The object of the invention is to provide efficient means for driving the different parts of the grinding machine, particularly the wheel spindle. This spindle is driven at a high rate of speed, and in order that nice work may be turned out by the machine, as shown in cut, it is necessary that the driving means should drive the wheel spindle without jump or jar, and yet have sufficient power to compel the rapid movement of the wheel under considerable grinding strain.



The means for tightening the belt for the work becomes one of great importance, and this is complicated in a machine of this type by the necessity for adjustments of the head stock and wheel stand, to adapt them to different classes of work.

1,066,312. July 1, 1913. **Process of Producing Clad Metals.** W. M. Page, Philadelphia, Pa.

This invention relates to processes of producing clad metals; and it comprises a method of making clad metals wherein a billet or ingot of steel containing carbon is treated, as shown in cut, to remove the carbon superficially and a film or layer of copper or copperlike metal is thereafter weld-united to the treated surface; and it also comprises certain improvements in processes of weld-coating metals.



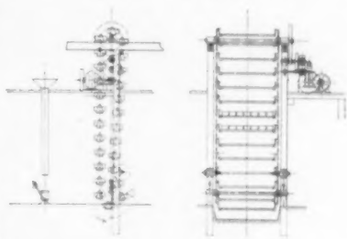
The inventor claims:

In the manufacture of clad metals, the process which comprises producing a ferrous metal billet filmed with copper, placing the same in a mold and adding a further quantity of a molten high-melting ductile non-ferrous metal, the manner of addition and the temperature of the molten metal and of the mold walls being so mutually regulated that a setting of the molten metal along the mold walls is produced prior to molten metal contacting with such filmed billet.

1,066,835. July 8, 1913. **Mold Table.** Edgar H. Mumford, Philadelphia, Pa.

This invention has reference to the provision of an improved form of apparatus for supporting molds in a foundry, and carrying them from one point to another at which they are poured, and then transfering them to still another point at which they are taken off the support and the castings taken out.

The first of the objects of this present invention is the provision of a device of the character specified, as shown in cut, which will very much economize in the space necessary for handling molds in a foundry, and which will also handle said molds in a more satisfactory and economical manner. A further object of the invention is the provision of mechniasm of this general type in which the molds after being poured are gradually elevated at a point at which they are above the sand floor, which latter is located above the mold floor or foundry floor, and thus a convenient means is provided for separating the sand and castings after they have cooled, and at an elevation from which the sand can be reconveyed through proper chutes and hoppers to the molding machinery employed, and the castings also transferred to the machining department by the action of gravity.



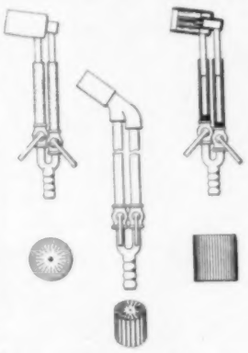
With respect to the saving in space above mentioned a further object of this invention is to eliminate the loss of space incident to the room required for movement of the transfer devices when traveling in a horizontal plane.

1,066,915. July 8, 1913. **Brazing Burner.** W. W. Kemp and W. H. Van Horn, Baltimore, Md.

This invention relates generally to what are known as blast and brazing burners, but more particularly to the tips or nozzles therefor, and has for its object to provide a tool especially adapted for use in connection with hydrocarbon

gas as a fuel made from a suitable hydrocarbon in the ordinary manner.

Great difficulty has, heretofore, been experienced in using hydrocarbon gas under pressure as a fuel for this type of burner, because of the inability to keep constantly ignited, and at times to ignite, a stream of gas flowing through a small opening to produce a long needle-like flame, so necessary in certain arts and manufactures.

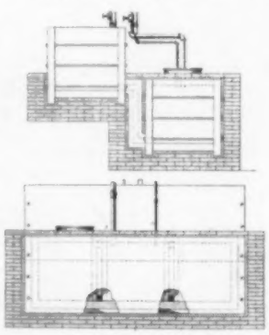


In the present invention, however, practical use has demonstrated its great success, as by its means a continuous and powerful jet flame of relatively great length and either small or relatively large diameter may be produced, and which may or may not, as desired, terminate in a fine needle-like point; and also what is sometimes called a "soft" flame may be quickly produced as the requirements of the operator demand by simply varying the feed of gas without change of any kind in the burner tip or nozzle.

The tool, to which the improved burner tip or nozzle is herein shown as applied, is simple in construction and inexpensive to manufacture; the parts are few in number and easily assembled by ordinary workmen; there is no danger of "back fire" nor a rapid burning out of the tip or jet nozzle due to the intense heat of the flame.

1,066,993. July 8, 1913. **Apparatus for Pickling Metal.** C. J. Carey, Baltimore, Md.

This invention relates to an improved apparatus for pickling metal and is particularly applicable for use in pickling sheet metal articles such as buckets, pails and other articles, to prepare them for further treatment, such as galvanizing.

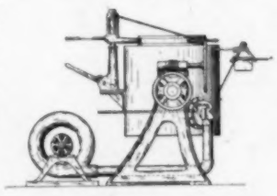


The object of the invention is to combine two tanks, as shown in cut, one higher than the other which have a communication from the bottom of one to the bottom of the other and to seal the lower tank while leaving the higher tank open so that the pickling solution may be drained by gravity from the higher to the lower tank and be forced back from the lower to the higher tank and held in the latter by air pressure which latter will agitate the solution during the pickling operation.

1,066,995. July 8, 1913. **Tilting Metallurgical Furnace.** W. W. Case, Jr., Denver, Colo.

This invention relates to metallurgical furnaces and has for its object to increase the efficiency of the action of such furnaces, and in a lesser space of time than has heretofore been required for melting operations.

A further object is to decrease the cost of operation to a minimum, and also to decrease loss by breakage of the crucibles and injury to the furnace lining. And a still further object is to reduce the usual roaring noise of such furnaces to a minimum.



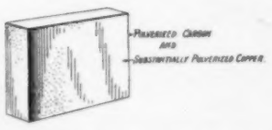
The inventor claims:

In a metallurgical furnace, as shown in cut, the combination of a pivotally-mounted furnace provided with a pouring lip, means for tilting said furnace, a crucible supported in said furnace having a spout discharging to said lip below the top edge of said crucible, a bracket secured to said furnace, bearings adjustably mounted on said bracket, and a pedant frame journaled in said adjustable bearings for supporting a mold in position for receiving the discharge from the furnace lip in the tilted position of said furnace.

1,067,003. July 8, 1913. **Process of Making Electrical Conductors.** Wm. Deats and Campbell Scott, Yonkers, N. Y., assignors to National Carbon Company, Cleveland, Ohio:

The invention consists first in blocks of intimately mixed pulverulent carbon and metal or metals; and second, the process of making the same.

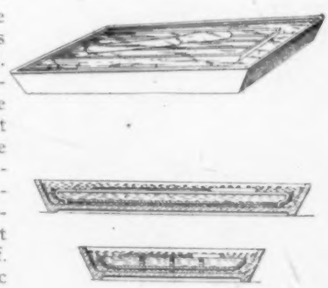
In preparing the blocks, as shown in cut, it is first necessary to reduce the carbon to a finely pulverulent condition, which result may be effected in any suitable manner. It is also necessary to reduce the metal or metals to be employed to like condition. Finely powdered or pulverulent metal suitable for use may be obtained by precipitating the metal from a metallic salts solution, the method of procedure being well understood. In the case of some metals they may be pulverized by grinding, as for example, in a ball mill. The inventors have invented a process of producing suitable finely powdered copper which is the subject of an application for a patent filed contemporaneously with this application. It is, however, a matter of no consequence whatever in connection with the present invention as to how the metal is reduced to the necessary finely pulverulent condition.



1,068,388. July 22, 1913. **Apparatus for Cleaning Gold, Silver and Other Metal Ware.** J. M. Hotchkiss, of Burlington, Vt.

This invention relates to an apparatus or means for cleaning gold, silver and other metal ware, the object of the invention being to provide a simple, cheap and efficient method and means for rapidly cleaning metals by electrolysis.

In carrying the invention into practice, a battery element is employed comprising a tray-like body, preferably of oblong rectangular or similar form, and having upwardly projecting side and end walls, forming a shallow pan-shaped support. The end walls of this support are provided with grooves in which are fitted and suitably secured the downwardly bent ends of a series of wires extending longitudinally above the body and providing a grate-like surface on which the metallic article or articles to be cleansed are placed. As shown in cut, the downwardly bent ends of the wires preferably project through the bottom of the body and form legs to support the body at an elevation, to enable the electrolyte to come in contact with all surfaces thereof. The body is made of zinc and the wires composing the rack are made of copper.



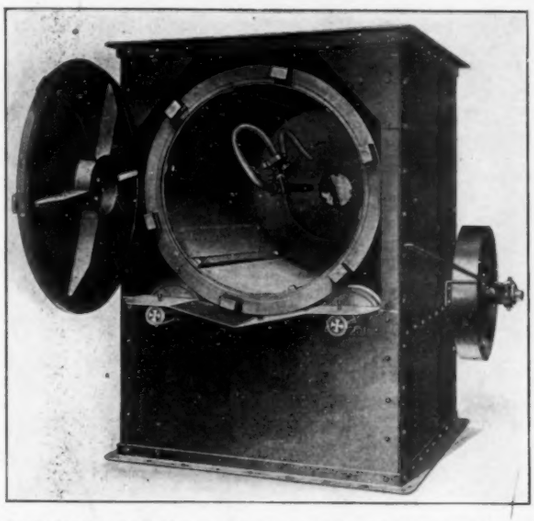
In carrying out the process, there is first prepared an electrolytic bath or solution formed of ordinary table salt (chlorid of sodium) and water, combined in the proportions of about two tablespoonfuls of salt to a quart of luke warm water. This solution is placed in a shallow earthenware or other suitable non-conducting vessel having a bottom large enough to support the battery element and permit the latter to lie flat thereon and to be immersed in the solution, after which the article or articles to be cleansed are placed upon the grating. An electric battery is thus formed which decomposes the water. If the hydrogen, which is then in a nascent state, is allowed to pass off through gold or silver ware which is placed upon the copper grating, the hydrogen combines with the oxids, which appear in the form of tarnish, and removes them, leaving the ware bright and clean, and as the hydrogen will not combine chemically with the silver or silver ware, the ware will be cleansed without injury.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

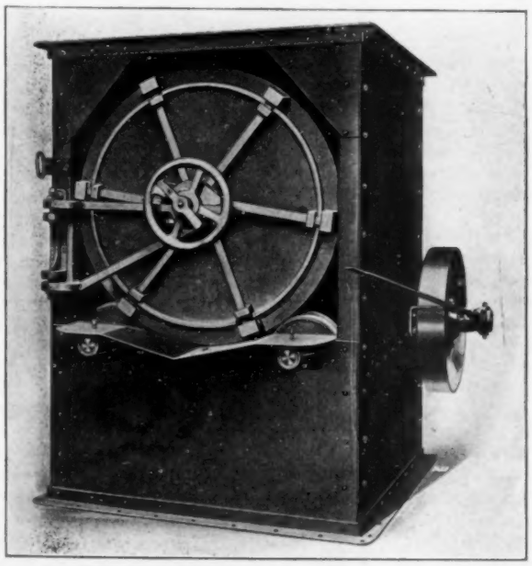
DUSTLESS SAND BLAST BARREL

The De La Vergne Machine Company, Mott Sand Blast Department, New York, have lately developed a new sand blast machine, as shown in cuts, for cleaning small and medium sized castings. This machine uses only one oscillating nozzle, which marks a new departure in the barrel type of sand blast cleaning machines. This nozzle oscillates on the line of the axis of the



THE MOTT DUSTLESS SAND BLAST, SHOWING NOZZLE.

barrel and throws the blast and grit along a line coincident with the axis and the resulting movement approximates the moving of a nozzle steadily back and forth by hand, thus forcing the air and grit at the work instead of the work being brought under the blast. This oscillation of the blast nozzle is obtained from an eccentric keyed to the driving shaft. The employment of one oscillating nozzle reduces the cost of operation very materially,

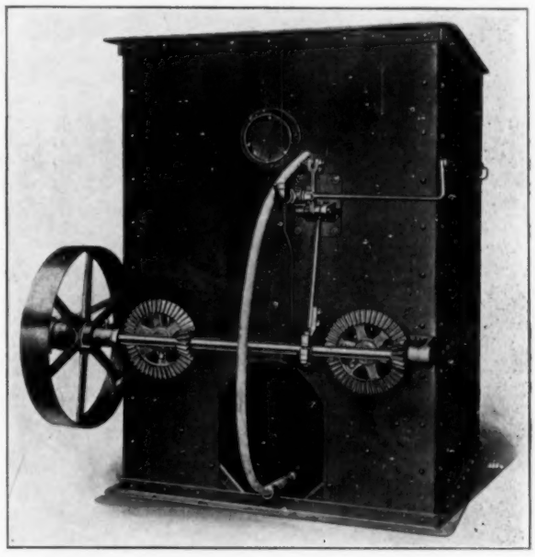


THE MOTT DUSTLESS SAND BLAST READY FOR WORK.

in other words this sand blast does with one nozzle what other barrels do with three and four nozzles. Consequently this machine uses only one-half to one-quarter the usual volume of compressed air.

The barrel is made of one piece of 5/16-in. steel boiler plate and built within two heavy cast-iron rings which support it and in turn are supported by four cast-iron flanged wheels on which the barrel revolves. The barrel is perforated in such a manner that it serves as a screen, the abrasive material falling through and converging in a hopper under the barrel. From the hopper it is drawn by suction through a feed hose to the nozzle and used over and over again. In first starting the machine, after the power is connected, all that is necessary is to place grit in the hopper. The barrel is closed at the operating end by a sliding clamp door which revolves with the barrel and can be opened when the latter is at any position. About a quarter turn of a small handwheel unlocks the door, which is carried on a trunnion bearing which in turn is supported by a bracket on the case.

The flanged wheels supporting the barrel are keyed to 2-in. shafts which run in boxes attached to and outside of the case and which are driven by wide-faced gears meshing with beveled pinions as shown herewith. The shaft carrying the pinions is



THE MOTT DUSTLESS SAND BLAST, BACK VIEW.

driven by a jaw-clutch pulley 24 in. in diameter with a 3-in. face. The speed of the pulley should be 24 r.m.p., giving a speed of 2 r.m.p. to the barrel. Owing to the slow speed it is pointed out that delicate castings with sharp corners are not injured, as the revolving of the barrel is solely for the purpose of presenting all sides of the stock to the blast.

A 6-in. hole to which may be attached a pipe running to an exhaust fan is located near the top of the back of the case. Where an exhaust fan is used the dust can be discharged in the outer air, through a chimney or otherwise. The operation of the mechanism is controlled from the work side of the machine by one lever for opening the air valve and another for operating the jaw-clutch pulley. The pulley can be placed at either end of the drive shaft to suit convenience, though it usually is placed at the right-hand side. All of the bearings of the machine are outside of the case and protected from dust and grit.

BRISTOL'S NEW PRESSURE GAUGE

An illustrated article was recently published describing the spring pressure tube designs of recording differential pressure gauges as made by The Bristol Company, of Waterbury, Conn. This company is now putting on the market another invention of its president and founder, Prof. Wm. H. Bristol, as illustrated in Fig. No. 1.

FIG. 1. BRISTOL'S FLOAT TYPE RECORDING DIFFERENTIAL PRESSURE GAUGE.

This is a new float type differential recorder which was patented August 15, 1911, and has been tested under practical operating conditions in steel works. It was developed to meet requirements for which the spring pressure types of differential recorders are not suitable, that is, for very low ranges of differential pressure in air, gases, liquids or steam, for applications where the static and differential pressures fluctuate rapidly, and also to satisfy the demand for instruments to record the rate of flow or volume directly on charts having uniform graduations in units of flow or volume. As these gauges will operate on extremely low differential ranges they are particularly well adapted for use in connection with Pitot Tubes for recording volumes of liquids, air or gases.

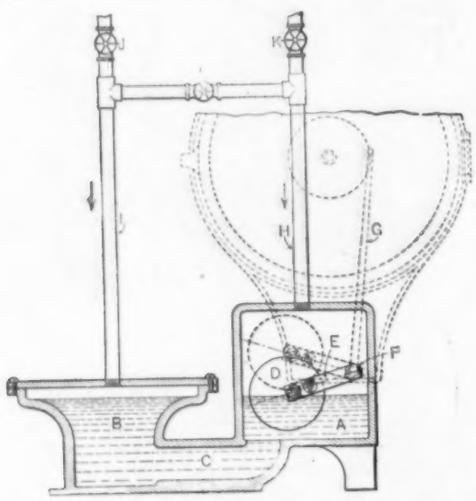


FIG. 2. SECTION OF BRISTOL'S FLOAT TYPE RECORDING DIFFERENTIAL PRESSURE GAUGE.

Fig. 2 is a reduced reproduction of a 24 hour record of the flow of blast furnace gas, made by one of these instruments in connection with Pitot Tubes, as one of the largest blast furnaces in the United States. It will be noted that this chart is graduated in thousands of cubic feet of gas per hour, the range being from 0 to 500,000 cubic feet per hour. The working part of the chart above 150,000 is provided with uniform volume graduations. The actual differential pressure for the total range of the chart shown was 0 to 1.46 inches head of water. From this it will be seen that with a simple inexpensive Pitot Tube it is possible to obtain sufficient differential pressures at slow rates of flow to directly record the amount and variations of the volume.

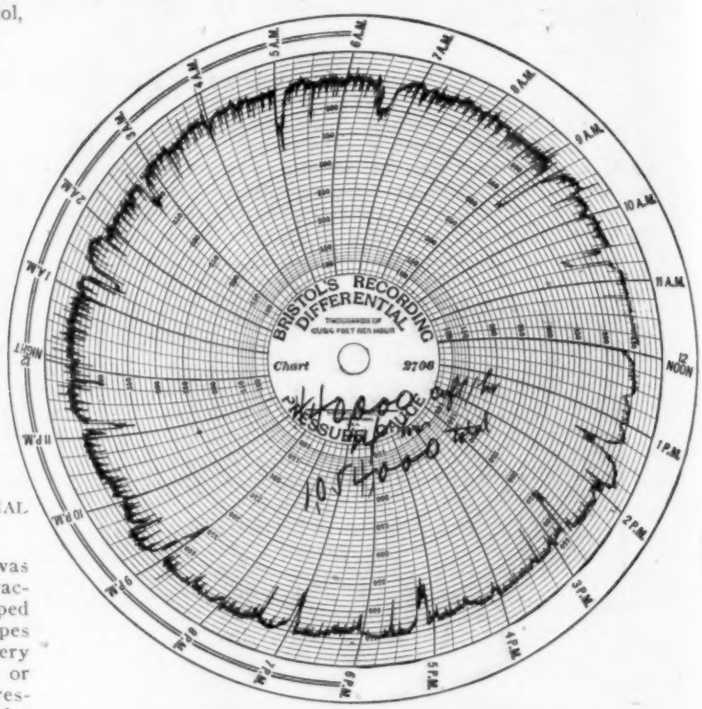


FIG. 3. CHART TAKEN FROM BRISTOL'S DIFFERENTIAL PRESSURE GAUGE, RECORDING RATE OF FLOW OF BLAST FURNACE GAS.

This instrument may be used to record the head of water in tanks under varying pressures, as, for instance, height of water in steam boilers and condensers. Another special application is that of recording the flow of water through a notch or over a wire, even though liquid is under pressure or a vacuum.

Full particulars regarding this instrument will be forwarded on application to The Bristol Company, Waterbury, Conn.

SILVER-ALUMINUM ALLOYS

William A. McAdams has made arrangements with the Fulton Foundry and Machine Company, Brooklyn, N. Y., to begin the manufacture of castings of a line of silver-aluminum alloys recently invented and patented by him.

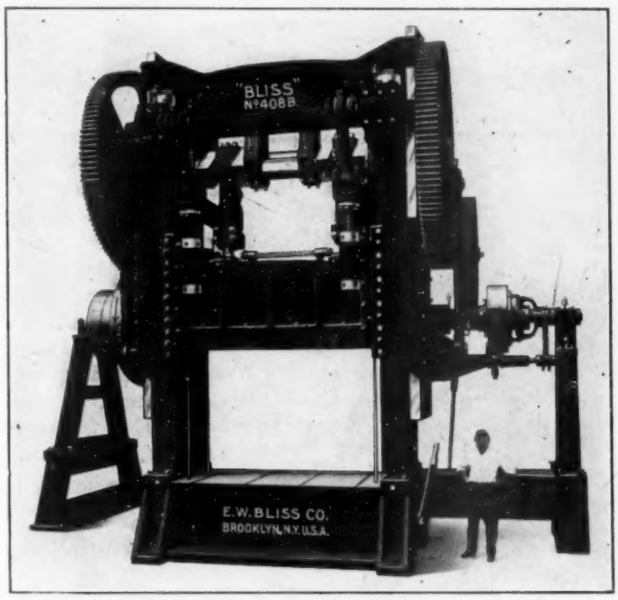
These alloys have been given the following names: Argental Argalcum, Agalcuzan, Macadamum, Altinum and Alancuzan. The claim is made for this list of alloys that they are the only ones of the commercial metals known which are non-tarnishable in the air, are non-poisonous and will stand nitric acid. These silver-aluminum alloys are absolutely pure and have great strength and wearing qualities, and it is said will produce three or four articles where all other metals make only one and, therefore, they are the cheapest and best white metals that can be used. On account of the low price at which they can be produced they compete with any of the commercial metals, such as brass, copper and bronze.

The company which has been organized to sell these alloys is the North American Selling Company, and they state that they are ready to supply castings from any of the above mentioned alloys and also aluminum alloy die castings, together with solder for aluminum, brass and silver-aluminum alloys. Further information and prices about these wonderful alloys or metals may be obtained from the North American Selling Company, 120 Liberty street, New York.

DOUBLE CRANK TOGGLE DRAWING PRESS

A new type of press called a double crank toggle drawing press, the principal features of which are patented, has recently been designed and built by the E. W. Bliss Company, of Brooklyn, N. Y. This type of press, one of which is shown in the accompanying illustration, is particularly adapted for drawing and forming from the heavy gauges of sheet metal, articles of large area and considerable depth, such as, automobile radiators, fenders, stove tops and a similar class of work. For doing the class of work for which it has been designed, it presents many features of advantage over the standard double crank presses which in connection with spring pressure attachments were formerly used. This being particularly so if the article to be produced has considerable depth.

The particular press illustrated is one of the series which the Bliss Company have recently built, and while not the largest of the series, it will be seen from the illustration that the machine is of very large proportions, having a height of 19 feet, occupying a floor space of 235 inches right and left by 104 inches front and back and weighing 120,000 lbs. The construction is very rigid and of what is known as the tie rod type in which the bed, uprights and crown piece are tied together by four vertical steel tire roads which are shrunk in place and which take the entire working strain, relieving all cast iron



BLISS DOUBLE CRANK TOGGLE DRAWING PRESS.

parts from any tension. The design of the machine is such that power is transferred from the main driving gears to the outside slide or blankholder through a series of toggles and a dwell of 110 degrees obtained. The number of toggles and connections used is the minimum to obtain efficient results. In order to maintain in wide presses, such as the one illustrated, this simple and efficient construction, and at the same time avoid any torsional strain, it will be noted that power is transferred to the outside slide or blankholder from both ends of press. This construction is also followed out in connection with crank shaft which operates the inner slide, in that the crank shaft is twin driven, a driving gear being on each end of the shaft. The small number of connections or links used in transmitting power to the outside slide or blankholder insures a minimum power consumption, and in addition makes a simple, compact and strong construction which appeals to the practical press user, and one in which wear is reduced to the least possible amount. To further reach the point of minimum wear the connection pins are hardened and ground.

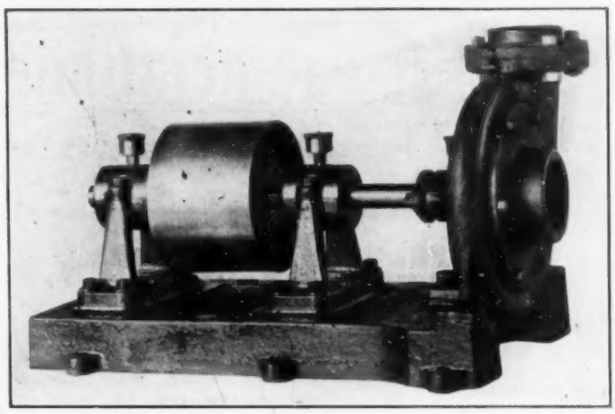
Some of the principal dimensions of the machine illustrated are as follows:

Distance bed to inner slide stroke and adjustment up 68 inches.
Distance bed to outer slide stroke and adjustment up 60 inches.
Stroke of inner slide 18 inches.
Stroke of outer slide 12¼ inches.
Area of bed 44 inches F & B × 84 inches R & L.
Area of face of blankholder 42 inches F & B × 76 inches R & L
Area of face of plunger 30 inches F & B × 68 inches R & L.

THE DIXON CASCADE PUMP

The pump shown in the accompanying cut is known as a No. 3 centrifugal pump, belt driven, manufactured by the Dixon Cascade Pump Company, Newark, N. J.

This pump is single low pressure, with a suction 3½ inches and a discharge of 3 inches. The pump weighs 350 pounds and when run at 1,500 to 1,800 revolutions per minute will force and drive out water, it is claimed, for thousands of feet. These



THE DIXON CASCADE ACID PUMP.

pumps are made of iron and also of bronze and the bronze is acid proof as near as possible to make it and is, therefore, extremely valuable for pumping the circulation of acids and other corrosive liquids and is now being used extensively by a great many chemical factories. Owing to this high efficiency as a pump it is said to be unique for use in large buildings as a means of fighting fire.

Catalog M, giving full descriptions of the various styles of pumps made by the Dixon Company, may be had upon request.

RELEASE CHECK FOR THE COWAN TRANSVEYOR

The Cowan Truck Company, of Holyoke, Mass., have designed a release check for their transveyor which allows the operator to release the load entirely independent of the handle. The

RELEASE CHECK FOR COWAN TRANSVEYOR.

check lowers the heaviest loads without shock or jar and the transveyor can be operated with one less motion than was before possible. The operation of the Cowan transveyor has always been exceptionally simple—pulling down the handle ele-

vates the load and automatically locks it in place, and to lower the load it is only necessary to hold the handle in the horizontal position, step on the foot pedal and control the handle back to the vertical position. The descent of the load was proportionately as rapid as the return of the handle to the vertical position. This last motion, however, has been eliminated by the new release check and the operation of the transveyor has been further simplified. To raise the load the action is the same but to unload it is only necessary to step on the foot pedal—the handle is not used in any way, and the load is under control of the check at all points in descent—it comes to the floor without the least possibility of shock or jar.

PLATED AND DECORATED METALS

Messrs. Hille and Müeller, Shoenau, Austria, are now importing their plated and decorated metals to this country, where they are represented by L. C. Hirsch & Company, 18 Cliff street, New York. It is said that the Austrian firm are the pioneer manufacturers of plated metals and sell in the neighborhood of two million dollars worth a year abroad. This firm produces nickel, brass, copper and gold plated metals in sheet form, on zinc, tin and steel, and as these plated metals will stand drawing, stamping, and even deep spinning, there is a considerable saving in their use to manufacturers as it saves time, labor and money.

Among the largest industries now using plated and decorated metals are manufacturers of toys, musical instruments, pocket mirrors, metal tags, buttons, metal novelties, reflectors, pocketbook frames, escutcheons, metal signs, kitchen utensils, humidor linings, alarm clocks, hardware specialties, etc. Particular attention is called to the nickel plated strip steel which is obtainable in long, endless coils, of cold rolled strip steel, and something new which should be of great interest to American manufacturers. Sample boxes will be submitted to interested parties, as the importers believe this will be the best means of advertising.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

THE FOUNDRY AND MACHINE EXHIBITION COMPANY

President, F. N. Perkins, Freeport, Ill.; Secretary, C. E. Hoyt; Treasurer, J. S. McCormick, Pittsburgh, Pa. All correspondence should be addressed to the Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill. The objects of the Association are for the commercial and technical education of iron and metal industries by co-operating with all foundry and manufacturing interests in making an annual exhibit of supplies and equipments in connection with the meeting of the American Foundrymen's Association. The exhibition for 1913 will be held in Chicago, Ill., October 10-17.

The success of the exhibition in connection with the convention of the Brass Founders, to be held in the International Amphitheatre Building in Chicago, Ill., October 10 to 17 of this year, is assured and from every viewpoint will be the greatest event of its kind ever held.

Those who exhibited at and visited the Buffalo, N. Y., exhibition last year will appreciate its magnitude when they learn that the exhibit will be fully three times as large as the Buffalo show, and at the time this is written more than 150 firms have applied for space, and already twenty thousand more feet of floor space than were to be had at the Buffalo exhibition are taken. It is conservatively estimated that by convention time more than 200 exhibitors, using nearly 80,000 square feet of floor space, will have their exhibits in place.

Another feature that is very gratifying to the management is that nearly every firm who exhibited last year have asked for an average increase of space amounting to more than 30 per cent.

While the exhibitions of 1911 and 1912 had but few machine tool builders participating as exhibitors, though many of them had representatives at the exhibit, this year more than 30 tool builders have applied for space and will have working exhibits during the exhibition.

Secretary Hoyt has just announced that the headquarters of the Foundry and Machine Exhibition Company is now at Room 206 Sherman Hotel, Chicago, Ill.

AMERICAN INSTITUTE OF METALS

President, L. W. Olson, Mansfield, Ohio; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held at Chicago, Ill., October 13-17, 1913.

Secretary Corse has issued an advance call to the members of the Institute in reference to attendance at the Annual Convention to be held in Chicago, Ill., October 13 to 17. Mr. Corse says in the opening paragraph of Bulletin No. 23 for July:

"Only three months now to the big Convention of the Allied Foundry Industries at Chicago. The headquarters of the American Institute of Metals will be at the Hotel La Salle. Get your reservations early so as to have all of our members in the one hotel. Meetings will be held on the same floor with the American Foundrymen's Association in Hotel La Salle. The Committee on Arrangements believes that the meeting rooms are the best that we have had so far and urges everyone to be present if it is a possible thing."

Mr. Corse says also in the same bulletin relative to the work connected with standard methods of analysis that the Institute has undertaken that: "The Secretary and the Chairman of the above mentioned committee have had a talk with Dr. Stratton, head of the Bureau, and are now arranging, with him at his request, a joint committee meeting of members from the American Institute of Mining Engineers, American Society for Testing Materials and the American Institute of Metals, to be held in Washington in the early fall, to go over the co-operative work that is being undertaken by the Government. The outlook for valuable and instructive results is excellent."

Mr. Corse further says: "The Executive Committee are conducting a campaign for new members and need the help of everyone in the Institute. Let every member help out by getting at least one new member and use the enclosed application blank for that purpose."

AMERICAN ELECTRO-PLATERS' SOCIETY

The regular monthly meeting of the New York branch was held at their rooms, 309 West Twenty-Third street, July 25. There were thirty-two members present. The application of one active member was received and accepted. An interesting discussion was had on pickeling or not pickeling cast iron before nickeling.

The regular monthly meeting of the Philadelphia branch was held Friday, July 25. It was decided that the meetings hereafter be held on the first Friday of each month. No meeting will be held during August. A discussion was had on silver solutions.

ITEMS OF INTEREST TO THE INDIVIDUAL.

ALBERT SAUVEUR

The Franklin Institute of the State of Pennsylvania, acting through its Committee on Science and the Arts has awarded the Elliott Cresson Gold Medal, the highest award in the gift of the Institute, to Professor Albert Sauveur, of Harvard University, Cambridge, Mass., in recognition of his numerous and important contributions to the science of Metallography, and the influence he has exerted in bringing this science into practical and exceedingly useful application in the metal industry.

Professor Sauveur was born in Louvain, Belgium, in 1863. He came to this country at an early age and studied at the Massachusetts Institute of Technology, from which he was graduated in Mining and Metallurgy in 1889. He was chemist and metallurgist to various steel companies for some years following his graduation until 1898 when he began his career as investigator, educator and author in the metallographical field. He was manager and proprietor of the Boston Testing Laboratories from 1897 to 1905.

His literary contributions to the science include some fifty papers and articles. In 1898, he began to write for the "Metallographist," a quarterly journal of which he was editor, and which was published by the Boston Testing Laboratories, which he also owned and managed. This journal continued until 1903, when it was succeeded by the "Iron and Steel Magazine," which Professor Sauveur edited and published for three years. Another of his contributions to the science consists of his designing special apparatus for the use of metallographists.

Professor Sauveur is an officier d' Academie; he is a member of the American Association for the Advancement of Science, a fellow of the American Academy of Arts and Sciences, a member and ex-vice-president of the American Institute of Mining Engineers and a member of the Iron and Steel Institute of Great Britain.

PRESIDENT BROOKER'S OPINION

In its issue of August 2, the New York *Times* printed the following opinion from Charles F. Brooker, president of the American Brass Company.

"Charles F. Brooker, of Connecticut, one of the oldest members of the Republican National Committee, thinks that the Republican party will change its name before the next presidential election, according to a cablegram from Paris to the Chicago *Daily News*.

"'If such a change is made,' Mr. Brooker is quoted as saying, 'the name probably will be the "Conservative Party." That is the word, anyway, that would best describe it. Personally I would be sorry to see such a change made, for I think there is no other political party in the world with such a glorious history as that of the party which carried through the civil war and brought about a peaceful reconstruction.

"'At the same time, this very name of "Republican" seems to antagonize a large Southern element whose interests otherwise are identical with ours. Certainly America never stood in greater need of a sound, experienced, and constructive party than it does today.'"

F. McCarthy, formerly associated with the Detroit Founders' Supply Company, Detroit, is now one of the sales representatives of the Hill-Griffith Company, Cincinnati.

Frank Powers has been appointed foreman of the polishing, buffing and nickel-plating department of the Sarnia, Ont., plant of the H. Mueller Mfg. Company, Decatur, Ill.

M. Z. Fox, formerly manager of the Detroit Foundry Supply Company, Detroit, is now associated with the Hill-Brunner Foundry Supply Company, Cincinnati.

John A. Logan, formerly foreman of the brass foundry operated by the National Cash Register Company, Dayton, O., is now in charge of the foundry of the Delco Engineering Company.

Samuel T. Greaves, formerly with the Vanadium Metals Company, Groton, Conn., has resigned to accept the position of superintendent of the foundry operated by the Vanadium Metals Company, Pittsburgh.

H. C. Bernard, who, owing to poor health recently resigned his position as foreman plater with Sargent & Company of New Haven, Conn., is now open for a similar position with a reliable firm.

Henry Wiesner, who for the past five years has had charge of the polishing and plating departments of the Atlantic Electric Company, of Norfolk, Va., is now foreman plater for the Royal Silver Manufacturing Company of the same city.

E. E. L. Taylor, for the past three years New England sales manager for the Derby Desk Company, and for fifteen years previously connected with the Library Bureau, has resigned his position with that company to take effect after August 11. Mr. Taylor will be connected with the Turner & Seymour Manufacturing Company, Torrington, Conn.

DEATHS

James R. Huber, western sales representative of the Lumen Bearing Company, Buffalo, N. Y., died from pneumonia at his home in Detroit, Mich., on May 8.

Michael H. Kopandiewicz, a manufacturer of brass goods, died July 24, at his home, No. 66 Bay Twenty-fifth street, Bath Beach, N. Y., of complication of diseases. He was born in Germany fifty-four years ago.

Raymond D. Unger, president of Unger Brothers, Inc., Newark, N. J., died at his residence in Upper Montclair on July 16. Mr. Unger was only twenty-six years old and succeeded to the presidency of the Unger Company at the death of his father, Eugene Unger, who was killed by a fall from a horse that he was riding at Madison, N. J., in 1909. Besides his wife, Mr. Unger is survived by his mother, his three-year-old daughter, two sisters and one brother, Kenneth Unger, who lives at East Orange, N. J.

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

BRIDGEPORT, CONN.

AUGUST 4, 1913.

The general business conditions in Bridgeport tend toward dullness but nothing more than is always felt in manufacturing lines during the summer season. The outlook for autumn seems especially good. The new corset factory of Birdsey Somers Company, called "The University of Corsets," has been recently finished and occupied. The building is of the most modern design and is surrounded by beautiful lawns and terraces with shrubs and blooming flowers. The building and grounds would give the impression of a mansion rather than a factory. To say the least it is a factory Bridgeport is proud to have.

The Bridgeport Board of Trade are planning to erect a massive electric sign along the railroad tracks at each side of the city calling attention to the many advantages of Bridgeport as a manufacturing city. This sign will be the largest electric sign between New York and Boston. The Molding machine formerly made by the Bridgeport Foundry & Machine Company has been taken over by the Bridgeport Die & Machine Company, who have secured the patents and rights to manufacture. Certain improvements will be made which will make the machine one of the most modern molding machines on the market.

The strike which has been going on at the plant of the Coe-Stapley Company is still unsettled. The strikebreakers who were brought from New York and who have been housed in the upper stories of the factory for many weeks have been discharged and sent back to New York. The Harvey Hubbell Company, manufacturers of pull sockets, have purchased the shirt factory at Long Hill, a suburb of Bridgeport, and will in the near future conduct a certain portion of their manufacturing there, thus allowing more space in their already large factory here.—L.

HARTFORD, CONN.

AUGUST 4, 1913.

Colonel George Pope, of Hartford, treasurer of the Pope Manufacturing Company and president of the National Association of Manufacturers, is not worrying over the charges of pernicious lobby and political activity made by Colonel Martin M. Mulhall, of Baltimore, against the manufacturers' association, and which, during the past month, have been thoroughly aired in the press and before the Senate lobby investigating committee in Washington.

That a great deal of the testimony which Colonel Mulhall was allowed to give in Washington should not be allowed as evidence was the opinion of Colonel Pope, expressed to a representative of THE METAL INDUSTRY. The association president does not make this statement, he explained, to criticize the committee, but to show the character of practically all of Mulhall's statements, which, he claims, are based on hearsay in nearly every instance. Colonel Pope officially denied many of Mulhall's charges against the association. Admitting that the manufacturers have maintained representatives at Washington to look after their interests, he said that the men had proceeded along honorable and honest lines alone, and had not been guilty of illegal acts so far as he knew.

Colonel Pope is the dean of Hartford manufacturers. As treasurer of the Pope Manufacturing Company, which is one of Hartford's largest concerns, he holds an important and influential position in the commercial field in Connecticut's capital city. He was elected president of the National Association of Manufacturers last May after having been a director of the association for several years. He expects to be called upon to testify before the Senate committee, and told THE METAL INDUSTRY man that he was ready to start the minute the chairman notifies him that he is wanted. "The association has nothing to be ashamed of," said he.

Mid-summer dullness in the manufacturing plants of Hartford is more noticeable this year than it has been in the past, and is taken by the industrial leaders of the city to indicate that the uncertainty connected with Democratic tariff and currency legislation has caused the factory leaders to proceed with caution. Many of the factory officials said as much when a METAL INDUSTRY man called at their office.

At the factory of the Pope Manufacturing Company, 700 men were laid off last month, and the plant was closed down for two weeks for inventory instead of the usual single week. An officer of the company explained this by saying, "The automobile business is a little heavy—soggy I mean—and we are going slowly. With the class of goods we manufacture, the financial condition of the country has much effect upon our business, and with the present currency and tariff agitation and legislation, even the banks are very cautious." The Pope Company manufactures automobiles, bicycles, speedometers and other equipment.

The Royal Typewriter Company took on 150 additional men two weeks ago, and trade conditions are being kept at a high mark, so Factory Manager Charles B. Cook said, by extension of the foreign business and establishment of special agencies in America. A policy of retrenchment is being followed by the company, however, in that it now keeps two months' supply of raw material on hand in place of the four months' supply it has kept on hand in the past.

Eighty men have been laid off at the Colt Patent Fire Arms Manufacturing Company's factory during the summer. At the Underwood Typewriter Company's plant there is no let-up in the business. The Pratt & Cady Company has laid off the usual number of men this summer. Edwin L. King, its secretary and treasurer, said that he notices the general condition of uncertainty in the orders sent in by jobbers. They insist that the manufacturers carry all the stock there is, and decline to order specialties they have no orders for.

Work has been begun on a new two-story factory addition for the Whitney Manufacturing Company. Its dimensions will be 112 by 60 feet. Clarence E. Whitney, president of the company, said that the addition is required by the growth of the company's chain business—that the machinery business has dropped rapidly since April 1.—S. L. M.

PROVIDENCE, R. I.

AUGUST 4, 1913.

All of the metal trades in this vicinity are now experiencing the usual mid-summer slackness in business, after having had, as a rule, average business through the first seven months of the year. In a majority of instances reports indicate that it is confidently expected that the remaining months will bring the aggregate for 1913 fully up to that of preceding years. Among the foundries practically all are at a standstill, but after a couple of weeks or so it is believed that they will start up on full time. The Brown & Sharpe Manufacturing Company closed August 2 for two weeks during which extensive renovations will be made throughout its plant.

Trade conditions among the manufacturing jewelers of this section are about the same as have prevailed for the past six weeks or two months and there appears but little prospect of any immediate improvement. A number of the plants are closed down for the vacation periods, while many others are operating on short time, with decreased complement of hands. There is a very optimistic sentiment expressed among the jewelers as to a good fall.

The Tilford Manufacturing Company, manufacturing jewelers, 163 Pine street, has announced that a controlling interest in the concern has been purchased by L. J. Hellman, who has been

prominently identified with the industry for several years. He will become general manager and traveling salesman while George H. Tilford will continue in charge of the factory.

A three days' convention of the managers and salesmen of the Gorham Manufacturing Company was held the latter part of the month at the concern's factory in this city, when about 50 men representing all departments and offices covering the entire country east of Chicago assembled and discussed matters pertaining to the conditions of business, the season's outlook and new patterns. Business sessions were held with luncheons at the company's casino and a sail to Newport with a lobster bake. John S. Holbrook, vice-president of the corporation, presided at the meetings.

Jacob A. Knasin and Arnold Greene, doing business as the New England Sheet and Tin Plate Company, at 10 Smith street, this city, have dissolved partnership. The business will be continued at the same place by Mr. Knasin under the same name. The Brown & Sharpe Manufacturing Company, Promenade street, is having a new addition built on Edith street. The building will be 75 by 175 feet, two stories high, of heavy steel construction with reinforced concrete floors and roof. It will have copper skylights and roof house.—W. H. M.

BOSTON, MASS.

AUGUST 4, 1913.

Trade conditions among the manufacturers in various metal lines are seasonably normal, the workers in gold and silver feeling the influence of political factors upon the outlook a little more, possibly, than those in other branches. This is only natural, however, for the products classed as luxuries rather than as necessities are most apt to be sensitive to conservative tendencies in finance and business.

Boston, in common with the greater part of New England, is undoubtedly sharing in the apprehension felt by the textile industries, which form such an important part of the manufacturing interests of this section, relative to tariff indications at Washington. When the textile mills are busily employed there is a large purchasing power in the numerous mill towns and cities. The fact that these mills are not running to anywhere near their full capacity, and that their future prospects are problematical, is known to every observant business man and banking institution, and causes a certain degree of hesitancy about indorsing optimistic plans for future business in sections for which Boston is the distributing center.

It is admitted at the same time that general business holds up remarkably well in the face of this adverse factor. Large concerns handling merchandise in brass, copper, lead, silver and other lines declare that the momentum of the period previous to the beginning of tariff consideration by Congress is still felt and that deliveries of goods keep up in fair volume.

The athletic season, with its increasing call for cups, trophies and other prizes, is a great boon in mid-summer to many of the silversmiths, as custom decrees that these prizes shall be made of silver or silver plated ware, and the present season hereabouts has been prolific of business in such products. The Tuttle Silver Company, for instance, finds the season about as busy as usual, and other firms doing similar work have no reason to be dissatisfied with the year's business to date.

In builders' requirements, especially brass and bronze work, there is a steady output also, and building operations continue of good proportions. William Hall & Company state that they find demand fairly well sustained, although they would not be rushed if more business were offered. "This year we might describe conditions by saying that when a man drops out from any cause from our force of employees, we do not feel anxious to replace him, but get along without putting any new men on," said a representative of the concern.

This seems to accurately describe the general situation for a great number of manufacturers. They are not putting on new men or filling places left vacant. Labor troubles have largely subsided, the chief disturbance now in the public eye being the strike at the big Hyde Park establishments, of which Gov. Eugene N. Foss is the principal owner. The governor claims that the strike was brought about and is continued for political effect. —J. S. B.

NEWARK, N. J.

AUGUST 4, 1913.

The manufacturing jewelers and silversmiths selling to the jobbing trade are through with the busy season until fall. Those selling to the retail trade, who are in the majority, have a quiet season, but are looking for a more active resumption of business in the fall months. During the hot summer months there will not be much business done, although the factories have opened again, after a short close down, being in shape to turn out orders if need be.

The John J. Jackson Company, making silver wire, sheet, anodes, etc., have moved from Mechanic street to their new factory building of their own at 156 Astor street. Have installed a new steam roller for their rolling mill.

There is considerable hand-made jewelry turned out here in the line of special order work. The machine and die stamped jewelry is not exclusive and does not bear the stamp of genius, artistic development or individuality that the hand-made article does. The firms who make the hand-made turn out only one piece from each design generally, a duplicate of it cannot be obtained and the design is destroyed. There are, however, some firms making oriental jewelry which is hand-made and any number of pieces are made from the same design.

There are millions of mesh bags made here. Many firms let out by contract the making of them and the contractor hires a number of girls. A girl can make two bags a day and get 55 cents a bag. Much of this work is done in the homes and it is all piece work.—H. S.

NEW BRITAIN, CONN.

AUGUST 4, 1913.

More indications of progress and prosperity in New Britain are shown through the announcement that the Corbin screw division of the American Hardware corporation is planning the erection of a new seven story building for manufacturing purposes at the corner of High and Lafayette streets, on property already owned by the company. Plans have not been completed for the building, but it will be of mill construction and will measure 120 feet in length by forty-five feet in width. The officials of the company have found it necessary to expand, because of constantly increasing business, which under the direction of Manager C. A. Earl, has had a steady growth.

A staff of seven experts has been at work in the Corbin screw division for the past year and a half installing a new system of keeping costs. Their work is completed, and W. A. Megley is now in charge of the rejuvenated department.

On July 24 the annual meeting of the stockholders of the North & Judd Manufacturing Company, saddle hardware makers, was held, and the following officers and directors were re-elected: President, Senator George M. Landers; vice-president and treasurer, H. C. Noble; secretary, E. M. Wightman; general superintendent, H. A. Johnson. Directors: G. M. Landers, H. C. Noble, A. J. Sloper, C. F. Smith, Harris Whittemore, A. A. Pope and G. C. Clark.

Throughout this past midsummer month the trade conditions among the metal manufacturers of this hardware city seem to be more than holding their own, and not one of the feared and prophesied predictions about closing down the factories has yet taken place or given any evidence of so doing.

The Peck, Stow & Wilcox Company, of Southington, Conn., a few miles out of New Britain, suffered a $50,000 fire on the night of July 23. Three buildings were destroyed and another and its contents damaged. The wrench department was badly crippled as a result. In speaking of the disaster to his plant General Manager Luke E. Fichthorn said: "It will not cripple us, we shall keep all our men at work. The ruins must be cleaned up, the machinery repaired and we will probably transfer some of the work into one of our new buildings temporarily, until we can have new structures built." The company is very busy at present and will push the work along as rapidly as possible in order to fill contracts now on its books.

Secretary and Treasurer E. L. King, of the Pratt & Cady Company, of Hartford, announces that there "is an evident policy of retrenchment on the part of the jobbers." His plant makes values and he says that the policy used by his customers is to "let the manufacturer carry the stock, and the manufacturer goes slow in making goods."—H. R. J.

WASHINGTON, D. C.

AUGUST 4, 1913.

The report of the Finance Committee in the present tariff legislation shows a number of important changes in the metal schedule. Below are given some of the more radical changes. The paragraphs and sections of the bill are printed in the form in which they were reported by the Committee on Finance, the added or substituted portions being underscored. The matter describing the changes made by the House bill is retained, and is followed by an explanation of the changes made by the Senate Commitee.

Aluminum, aluminum scrap, and alloys of any kind in which aluminum is the component material of chief value, in crude form, 2 cents per pound; aluminum in plates, sheets, bars, strips and rods, 3½ cents per pound; barium. calcium, magnesium, sodium and potassium, and alloys of which said metals are the component material of chief value, 25 per centum ad valorem. Aluminum, all forms, and barium and the other metals in paragraph 172, Tariff Law of 1909, are all subject to the same duty.

As reported to the Senate, the classifications of the present law are restored and the rate of duty on aluminum in crude form is fixed at 2 cents per pound, and on aluminum in plates, sheets, etc., at 3½ cents per pound.

The paragraph relating to antimony, as regulus or metal, has been greatly changed, the Senate Committee having stricken out the provision regarding the sampling of the ores, and the giving of bond. The paragraph as amended simply reads: "Antimony, as regulus or metal; antimony, oxide, salts and compounds of 25 per centum ad valorem."

Zinc-bearing ores of all kinds, including calamine 12½ per centum ad valorem: (increased from 10) provided, that on all importations of zinc-bearing ores the duties shall be estimated at the port of entry, and a bond given in double the amount of such estimated duties for the transportation of the ores by common carriers bonded for the transportation of appraised or unappraised merchandise to properly equipped sampling or smelting establishments, whether designated as bonded warehouses or otherwise. On the arrival of the ores at such establishments they shall be sampled according to commercial methods under the supervision of the Government officers, who shall be stationed at such establishments, and who shall submit the samples thus obtained to a Government assayer, designated by the Secretary of the Treasury, who shall make a proper assay of the sample and report the result to the proper custom officers and the import entries shall be liquidated thereon; except in case of ores that shall be removed to a bonded warehouse to be refined for exportation as provided by law. And the Secretary of the Treasury is authorized to make all necessary regulations to enforce the provisions of this paragraph.—J. J. M.

PHILADELPHIA, PA.

AUGUST 4, 1913.

Business has quieted down some for the summer, many having gone on their vacations. The shops are being overhauled, making repairs and improvements. A fairly good fall trade is looked for. The Panama Canal opening is expected to accelerate trade lines. The jewelry, watch case and silver goods lines are quiet. The brass, aluminum, white metal, bronze and supply lines have had a moderately good year.

The Hamilton Watch Company will probably have an exhibit at the local fair in the fall. Last year they displayed a watch, showing every part of the movement. This firm is at Lancaster, Pa.

Jenkins & Jenkins, of Baltimore, made a handsome solid gold, diamond studded chalice and paten for the Carmelite Convent of that city. It is 9½ inches high, valued at $3,000, has a base six inches in diameter of 18 karat gold. The cup is 3½ x 3¾ inches, of 22 karat gold. The outer lining of the cup is of old rose gold. On the base of the chalice is a crossed formed by a large diamond and ten small diamonds, the larger one valued at $1,000. The whole article complete was made from jewelry owned by Mrs. Potts, in memory of Rear Admiral Potts.

Thomas Strech, formerly in business in New York City, has taken charge of the plating department of the New York Manufacturing Jewelry Company, of Pittsburgh.—H. S.

READING, PA.

AUGUST 4, 1913.

The Franklin Specialty Company, of 809 Cherry street, do a general manufacturing business and make a specialty of five and ten-cent hardware, all highly nickel-plated. A new 1913 catalogue has been issued. Have completed instaling a first class jobbing plating plant with the latest equipment. Grant Painter, who was foreman of the shop, has been made manager. Fred Sodel, who was foreman of the Frankford Specialty Company, of Philadelphia, is the new foreman of this plant.

The Penn Chandelier Works will move from Pearl street to 538 Franklin street and will put in a show room.

The Reading Chandelier Company are erecting a three-story building of their own at 503 Penn street, and when completed will move from their present quarters at 537 Cherry street. This firm has a connection with the Reading Electric Company and is under the same management. They are very busy on automobile trimmings and have trouble in getting brass castings from the founders. They have quite a large government contract by the year, to make lighting fixtures for the various post offices and other buildings.

The Crescent Brass Manufacturing Company are building an addition to their plant to be used as a finishing room.

The Gray Iron Foundry have taken over the National Brass Company's plant at Tulpehocken and Green streets and are remodeling the same, to be used as a brass foundry, plating and finishing plant.

The Keystone Electric Company, of 906 Penn street, have started a factory in Peach street, to manufacture electric, gas and combination chandeliers. They were forced to enlarge, as they were short of space. Have put in a brass plating plant. Mr. Nander is the foreman.

The Adams Manufacturing Company, of 746 Cherry street, do a business as brass founders, platers, pattern and model making, for the fixture business mainly, making a specialty of hand finished work. They are contemplating improvements, but have not decided as to enlarging the factory. They are carrying a large line of rod and sheet brass, pipe tubing, are rebuilding intricate machinery and making brass goods and novelties also. They are employing 25 hands. John Kochert, formerly with the Chantrell Hardware Company, of this city, has taken charge of the plating and polishing department, he succeeding John Rickenbach, who has gone with the Reading Hardware Company.

The Franklin Brass Foundry, F. A. Gring, manager, have built a new plant which is a great improvement over the old one.

The Excelsior Brass Works have erected a new concrete factory, 100 x 25 feet in size, costing $9,000, in Tulpehocken street, putting in all the latest machinery and are now increasing the output by 60 per cent. They are extremely busy, working full handed, and have received enough contracts for electric desk fixtures to keep them busy until late in the fall. They are manufacturing lamps, portables, etc., and are getting ready to put out a new line of portables, also make a large line of hotel cuspidors, match boxes, etc., made of solid bronze. They have put out a new finish in white enamel, imitation ivory and statuary bronze, which are in great demand this year, making a fine line of metal novelties for advertising purposes as well as ecclesiastical goods. Have installed on the second floor three turret lathes to make their own fittings and screws and will do their own metal spinning. The large plating plant is in charge of Howard Strunk. In the brass foundry they make a specialty of fine castings for gas fixtures in charge of William Bush and are making a specialty of repairing and replating of silverware for hotels, etc. In the pattern department they do work for other foundries in iron, brass, aluminum and white metal. Even with the new building erected the plant is far too small, owing to the

large increase in business and one of the old buildings will be torn down to make way for another concrete structure. The newly elected officers are: H. E. Woodward, president; Harry Etheridge, treasurer; A. R. Fram, vice-president; Louis M. Gantert, secretary and superintendent. They have traveling men out covering Philadelphia and the East and Pittsburgh and the West. Fred Schaffer is the new man in charge of the designing.—H. S.

INDIANAPOLIS, IND.

August 4, 1913.

The Indianapolis Aluminum Casting Company, is a new concern in Indianapolis, and the only one making a specialty of aluminum castings in Indianapolis. They organized February 1, with a capital stock of $50,000, Ferd. Hollweg, president and treasurer, Frank Janes, vice-president, A. Potts, manager and Daniel Frown, superintendent. Mr. Frown came to Indianapolis from Detroit, where he was formerly superintendent of the largest plant of the kind in the country. The plant is now in operation, having a clear floor space for molders of 100 x 50 feet, core room, 75 x 25 feet, furnace room 50 x 25 feet, equipped with modern furnaces using artificial gas for fuel, melting capacity of 8,000 pounds of melting per day, a cleaning and shipping room, and a railway switch running into the plant, with ample room for enlargement as the business may demand.

The molding room is equipped with power and hand turnovers, air squeezers and sifters, the core room with two modern core ovens. The equipment is modern and up-to-date. The prospects at the present time are flattering, they having more work than they expected in so short a time, Mr. Frown having been in Indianapolis only three weeks.—K.

CANTON, OHIO

August 4, 1913.

R. E. Bebb, general manager of the Canton Stamping & Enameling Works, which concern has just increased its capital stock from $500,000 to $1,000,000, states that there is no connection between the increase in stock and the combine of enameling companies which has been anticipated for the past month. Neither has it any connection with the purchase of the Massillon Rolling Mills by local capital. He adds that the increase is merely a precautionary measure. No immediate enlargements or developments are contemplated. The stock will be held as treasury stock to provide for future development. The concerns to be included in the combination with the Canton Stamping & Enameling Company will be the Massillon Rolling Mill Company, and two stamping and enameling companies at Bellaire, known as the Novelty Stamping and Enameling Company and the Enterprise Stamping and Enameling Company and the Geiger Jones Company.—J. W. L.

COLUMBUS, OHIO

August 4, 1913.

Despite the usual dullness which always appears in July and August the metal market in Columbus and central Ohio has been fairly active during the past month. There is a fair demand for copper, brass and aluminum at prices which are about the same as the previous month. The tone of the market is good and about the only disturbing factor is the uncertainty occasioned by the tariff agitation.

The copper market is firmer owing to the strike at the copper mines which is being reflected upon the trade here. Scrap copper is quoted from $13.50 to $13.75 to the trade and no cutting of prices is reported. The aluminum trade is a little quiet owing to the tariff tinkering which is going on. The prices range from 22 to 23 cents to the trade.

Red borings, brass, is in good demand and the quotations range from $11.25 to $11.50. Red scrap brass is sold at $10 to $10.50. Yellow borings, brass, is sold between $7.50 to $8.00. No particular change is reported in the market for babbitt metal. Other metals are holding up well for the season of the year.

Practically all of the metal using concerns in Columbus and vicinity are busy. The John W. Brown Manufacturing Company, makers of automobile lamps, is rushed with orders from the Ford Automobile Company. The Ford company has purchased a site on Cleveland avenue and Buckingham street, Columbus, for the location of a branch factory where 300 men will be employed.

The Ohio Metal Company, which is located on Kimball street, is looking for a site upon which will be erected a modern plant. The company sustained a heavy loss through the March floods and is going to locate outside of the flood belt. It is the intention of Henry Loeb, head of the concern, to erect a one-story building, 50 by 150 feet, of brick and cement in which will be housed the business.

Negotiations have been completed for the merging of the Carman Manufacturing Company and the Columbus Tinware and Can Company, both of Columbus, Ohio. Both of the concerns are widely known and the consolidation means a large corporation. The Carman company has been located at 531-539 West Goodale street and the plant of the Columbus Tinware and Can Company at 78-82 East First avenue. The plants will be consolidated at the West Goodale street factory, where additions and extensions will be built. The new concern has a capital of $50,000. James L. Carman is president, A. W. Hershey, of the Columbus Tinware and Can Company, has been selected vice-president and John M. Armstrong, secretary of the Columbus Tinware and Can Company, will be secretary of the new organization. W. W. Gantz is treasurer. These officers together with George B. Donavin, Fred W. Palmer and Henry E. Stein, comprise the board of directors.

H. M. Geiger, of the Geiger Jones Company, of Canton, Ohio, to be known as the American Stamping & Enameling Company, states that the details of the consolidation have been completed and the three plants at Bellaire, Ohio, have been taken over. The Geiger Jones Company is the fiscal agent for the transfer of the stock of the American Company after July 15 will be the concern through which the sales are made. The consolidation of these various plants with a capital of $2,000,000 will make Canton a center of the stamping and enameling ware trade of the country.

Additions to the plant of the Buckeye Tank & Seat Company, 920 South Market street, Canton, Ohio, which will double the capacity of the concern according to Claude R. James, president of the company, will be opened July 15. The building was formerly occupied by the Arctic Ice Machine Company. Hereafter all of the brass hinges and valves used by the company will be manufactured in its own foundry. The increase in capacity will also cause an increase of 50 per cent. in the working force.

H. C. Milligan, president and manager of the Republic Stamping and Enameling Company, of Canton, Ohio, states that the increase of the company's capital stock from $400,000 to $1,000,000 has nothing to do with any project for the construction of a rolling mill.—J. W. L.

LOUISVILLE, KENTUCKY

August 4, 1913.

The Louisville members of the trades handling copper and brass, in particular, are not especially active just now, participating in the usual mid-summer lethargy which can nearly always be relied upon to attack business in the Middle West during July and August. While practically all of the distilleries in Kentucky have closed down, most of them, in fact, having ceased operations about the first of July, plant overhauling has not yet progressed to the point where orders for new equipment or for repairs to old have resulted. Active work among these and other prospects, however, on the part of the local supply men, has resulted in the location of numerous prospects, and the situation on the whole is regarded as unusually bright for a fine business in the fall. The only disturbing factor is the strike in the Michigan fields, which at present seems as far from settlement as ever. Aside from this there are no unfavorable conditions, and no warrant for any pessimistic feeling among the metal trades.

"Conditions in Kentucky and the bordering states are as good as they could be for a fine fall business," reports one of the leading metal dealers on the Louisville market. "The local drought may, of course, cut the Kentucky corn crop short, but elsewhere crop conditions seem to be favorable to a big crop.

and the whiskey manufacturers are therefore likely to produce fully as large an output as for this year, when 40,000,000 gallons were distilled. As to the metal market, the feeling seems to be very firm, and there is a rising tendency, due principally to the existing strike. If this is settled, however, as it should be, before very long, I see nothing in the way of moderate prices and an active season."

Matt Corcoran & Company, distillers' supply manufacturers, are already handling some distillery work, although no large contracts have as yet been turned over to them. Within a month, however, Mr. Corcoran looks for things to be rather lively, as he has a number of contracts in sight which should develop by that time. He has been out of the city for two weeks, on a trip which combined business and pleasure, and, incidentally, was fortunate enough to miss some of the hottest weather ever experienced in Louisville by his absence during that period.

The Vendome Copper & Brass Works has recently closed a number of good contracts for distillery business, and has a long list of others in sight. The plant is already fairly busy, taking care of the grist of small orders which it always has on hand, and with the present flattering prospects for an unusually heavy fall business, the company has every reason to regard the outlook as distinctly good. Some uneasiness has been felt over the danger of a possible shortage of material, if the strike in Michigan continues; but so far this has not developed, and the Vendome works, as well as other distillery supply concerns in Louisville, is hoping for an early settlement of the trouble, in order to prevent any such difficulty.

At Bristol, Tenn., considerable interest in the possibilities of zinc mining has been created by the reported sale of some zinc siftings secured from the iron mines in that section, and in the vicinity of Embreeville, Tenn., thirty-five miles west of Bristol, for a large sum. A number of shafts have already been sunk, it is reported, and all have yielded zinc ore showing a remarkably high percentage of the metal.

Upon the favorable report of its engineers, the Aluminum Company of America has decided to locate its first Tennessee plant at a point one and a half miles north of Maryville, Tenn., and fourteen miles from Knoxville. Options have been taken on 200 acres for site purposes, and ultimately, when a proposed hydro-electric power plant has been built on the Little Tennessee river by the company, a plant representing an investment of $15,000,000, and employing 5,000 men, will be erected. At present, however, the company will use only about 300 men, and will operate its plant with current developed by the Tennessee Power Company, to the amount of 20,000 horsepower a month. It will later develop its own power, as indicated.—G. D. C.

DETROIT, MICH.

AUGUST 4, 1913.

Brass and aluminum conditions in Detroit during the last few weeks have been unusually dull. While all the factories are operating with the usual number of employees the outlook for the near future is not of the best. Several plants are making needed repairs and a few are doing some expanding in the building line, but as a rule conditions are slow all along the line. Even the automobile industry is feeling the slowness of the times, but this condition in the motor trade is expected at this season of the year. Building conditions in Detroit and vicinity have not been quite as brisk at this season of the year as usual, although several contracts for large structures have been let, which in time will benefit certain lines of the brass trade.

Many of the large plants are now working on automobile accessories which will be needed later in the year when the campaign opens on next year's models. The Ford Motor Car Company is erecting at present a large addition to its plant which will, when completed, nearly double its capacity. This will add greatly to the company's output in the brass and aluminum line.

At the present time about the same conditions prevail as were experienced a year ago at the same period. While conditions are below what manufacturers would like, judging from the past, a revival will take place later in the season although things do not appear so very promising now. Manufacturers are optimistic and little complaint is heard, the present slow times being taken as a matter to be expected.

"It might be worse," is the way the majority of the manufacturers express themselves.

Many things have conspired this summer to pull trade down. The change of administration, the tariff and the uncertainty of things generally have all added to make an unusually dull season. However, conditions are largely attributed to the usual midsummer dullness and as a rule manufacturers expect a revival of business later in the year. No one seems to be discouraged and the vacation season is being enjoyed by many brass and aluminum manufacturers who if conditions were more lively would have to be at their desks.—F. J. H.

CHICAGO, ILL.

AUGUST 4, 1913.

Brass and metal manufacturers of Chicago have done a remarkably good business for the first six months of this year. All metal industries are busy and generally speaking the outlook continues bright.

The principal topic of conversation among foundrymen and metal workers is the coming convention of foundrymen and the foundry supply exhibition which will be held here October 10 to 17 and for which great preparations are being made.

The friction between the members of the Building Construction Employers' Association of Chicago and the various unions of the building trades has now reached an acute stage. The members of the unions declare they have been locked out unjustly by the Employers' Association and the union men have asked the county board to prevent the work on the county hospital from being stopped by the Employers' Association as this is one of the largest buildings in course of construction in the country at the present time. Many of the members of the latter body are not in favor of the sudden lockout which was ordered by the executive committee of the association. Mayor Harrison is using his best influence to avert any such serious clash between the unions and the Employers' Association.

As their is a large number of buildings in course of construction at present using large quantities of plumbing, steam, gas and electric fixtures, and architectural bronzes are used on an elaborate scale, it will affect the brass trade here in the different plants as they will be unable to install their fixtures until a settlement is arranged. The trend of business is still in the right direction even though there has been a slight let up in business.

This is ordinarily a dull period of the year and various restraining factors curtail activity yet encouraging features are manifest and cheerful views predominate. In the great crop producing states of the west optimism is general owing to the prospects of another prosperous year on the farms. As Chicago is the great commercial center or distributing point for the west, crop conditions figure largely in its business success.

Edward Edelmann, treasurer of the E. Edelmann Company, 225-31 W. Illinois street, manufacturers of automobile brass steam specialties and screw machine products, reports business good and behind on orders and unable to take up any new work which they intend to place on the market in the automobile line. They are unable to keep up with their orders on file and the plant is run to its full capacity on their regular line of goods. They report large orders from their Los Angeles branch, which is located at 615 San Fernando Building; also from their New York office, located at 1779 Broadway. They are also making large shipments to the different automobile factories of their grease cups, tire gauges and gasoline hydrometers.

The Crown Specialty Manufacturing Company is a new concern which has taken up the manufacture of the Crown Self-Closing Automatic Drinking Fountain, which they claim is the top notch of fountain perfection. They have applied for a patent on the valve. The Crown Self-Closing Valve is a balanced valve unaffected by the pressure. The handle is universal, being operable in any direction. They are to sell the fountains and valves separate if desired. They can be addressed, The Crown Specialty Company, P. O. Box 297, Chicago, Ill.

C. Erwin Norman Company, 29 Michigan street, manufacturers of air valves, pipe hangers and metal specialties, report business normal at this season of the year. The manufacturers of plumbing brass goods are all fairly busy and expect a busy season in the fall from the numerous enquiries they are having on prices and quotations.—P. W. B.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Robert Mitchell Co., Montreal, is erecting a new foundry.

The Ajax Company, Corry, Pa., is preparing plans for the erection of a new foundry.

The McHatton Foundry, Philadelphia, recently purchased the smelting plant formerly operated by John Wagner.

Anton Kunst has opened a business at 54 Wardell street, Astoria, L. I., with a small foundry and will cast gold, silver and artistic work.

The General Electric Company, Schenectady, N. Y., will add a new plating department to its plant at Lynn, Mass. The main building will be 60 x 180 feet.

The Buckwalter Stove Company, Royersford, Pa., contemplates the installation of a sand blast cleaning plant, and considerable polishing equipment also will be added.

The Johnston Harvester Company, Batavia, N. Y., is installing a battery of four units of reel type core ovens in its new gray iron foundry. The ovens were built by the Quigley Furnace & Foundry Co., Springfield, Mass.

The Aluminum Castings Co., Buffalo, N. Y., has awarded contracts for the addition to its Elmwood plant at Elmwood avenue and the Erie Railroad. Only part of the addition originally planned is being built at this time..

Scully-Jones & Company, 349 Railway Exchange Building, Chicago, Ill., have been appointed exclusive sales agents for the Ideal Furnace Company, Chester, Pa., to handle their coke fired crucible tilting furnace in Chicago and the Middle Western States.

J. Beckett and Charles Beckett, formerly affiliated with the Machinists' Foundry Company, Muncie, Ind., have organized the Delaware Brass & Aluminum Company, and have built a plant 60 x 80 feet, which will be devoted to the manufacture of brass and aluminum castings.

It is reported that the Aluminum Company of America broke ground at Knoxville, Tenn., on July 11 for the erection of its large plant two miles north of Maryville. Mention has been made of this plant several times in the columns of THE METAL INDUSTRY.

The Goshen Art Metalizing Company has been organized by Edward Wambaugh, 107 Middlebury street, Goshen, Ind., to do all kinds of job plating such as nickel, brass, silver, copper, gun metal, all kinds of oxidizing, and metalizing of plaster of paris figures and similar articles.

The published report that a plant for the manufacture of solder, white brass and white metal alloys will be erected by G. E. Jobborn on Guise street, Hamilton, Ontario, is said to be premature as for various reasons they have decided not to do so for at least a few months.

Manufacturers of mining machinery, rescue and first-aid apparatus and safety appliances are to be given an oportunity to display their wares before the mining men of the country at a great industrial exposition to be held under the auspices of the American Mining Congress, in Philadelphia, Pa., the week of October 20.

The American Iron & Brass Foundry, Incorporated, Los Angeles, Cal., has been organized with a capital of $20,000 and has leased the brass foundry at 688 Rio street for a period of two years. The officers of the company follow: C. S. Smith, president; H. H. Jones, secretary; A. H. Moore, treasurer, and W. T. Rabun, general manager.

The power plant of the Mueller Manufacturing Company, Ltd., manufacturers of plumbers steam, water and gas brass goods, Sarnia, Ont., Canada, a branch of the parent company at Decatur, Ill., was started in operation on July 4, the American National holiday and with a few minor adjustments will be in operation permanently from now on.

At the annual meeting of the stockholders of the Southern Aluminum Company last Monday, R. Merton was elected a director to succeed Z. Hochschield, deceased, and Paul Brinot to succeed Dr. Paul Heroult. The stockholders subsequently authorized an increase in the capital stock from $4,000,000 to $6,000,000 and the issuance of $6,000,000 bonds.

Estimates from nine separate bidders were opened by the Board of Water Supply, City of New York, on July 22. These bids were in accordance with contract No. 70 and called for ten 48-inch manganese bronze gate valves for the city tunnel. Paul S. Reeves Company, of Philadelphia, Pa., are the successful bidders with an estimate of $162,788, while the highest bid received was $298,000.

Smith, Richardson Company, Attleboro, Mass., have completed exhaustive tests, made by themselves and several metal goods manufacturers, of their new drying-out machine.

This machine was illustrated and described in our issue of November, 1912, and the manufacturers state that all that have been sold so far have proved very satisfactory for drying out metal goods of all kinds after plating.

The New Era Lustre Company, since its reorganization last winter, has gradually been concentrating its manufacturing facilities at Passaic, N. J., and anounces that its entire plant is now situated there and the factory at New Haven, Conn., closed. Their New York office is at 92 William street, where Franklin S. Cobb, president and treasurer, makes his headquarters and where all correspondence should be addressed.

The Benedict-Proctor Company, Ltd., of Toronto, Ontario, recently purchased the splendidly equipped manufacturing plant of Depier & Woodman Company, located at Allison, Ontario, Canada. They will manufacture an extensive line of silver plated holloware, art novelties and plated jewelry. An office and show room will be maintained in Toronto and their travelling force with Mr. L. G. Proctor as sales manager will thoroughly cover the entire Dominion.

To acquaint the plating trade with a new material, Sustanol, which is taking the place of cyanide of potash, the Hachmeister-Lind Chemical Company, of Pittsburgh, Pa., offers to ship at their own risk, freight prepaid, a 120-lb. carboy on approval. Sustanol has been imported until recently, by this firm, from Sweden, but, owing to some understandings between this house and a foreign concern, they are now making this material in the United States, on a royalty basis.

The Wolverine Brass Works of Grand Rapids, Mich., have completed a five story addition to their factory which gives them practically double the capacity of the former plant. Besides the large additional manufacturing and office space which the new addition affords there is included also, a foundry, 50 x 156 feet, and a foundry stock room, 50 x 60 feet. The foundry is of strictly steel and brick construction and steel movable shelving is used, as is done throughout the entire building.

The Vulcan Detinning Company announced July 18 that it would not pay the regular dividend on the preferred stock of the company. One reason given is that the American Can Company had failed to pay the amount won from it by the Vulcan company in a suit charging infringement of patents. Another is that market prices of the Vulcan company's products have suffered in the last eight months while prices of tin scrap, from which it manufactures it products, increased.

The Unique Brass Foundry Company, 25 Illinois street, Buffalo, N. Y., has purchased a site for a foundry plant at Grant street and the New York Central R. R. They expect very soon to erect a modern foundry 150 x 50 feet and also expect to incorporate for $25,000, with very little or no stock for sale. They state that they expect to have an up-to-date foundry in every respect and hope to do more business in the future than in the past. This company makes a specialty of automobile castings, manganese red and yellow bronze, copper and aluminum.

The Standard Supply Company, manufacturers of platers' compounds, New Haven, Conn., report that the new product "Sopo," which was recently placed upon the market is rapidly finding its way into all large concerns that use platers' compounds. It is claimed by the company that "Sopo," as used for barrel rolling and burnishing, will save the users from 90 to 100 per cent over other compounds. J. H. Clarke is president and treasurer and N. E. Clarke is secretary of the company, which has been in the cleaning compound business for 28 years.

Owing to the increase of business the E. W. Bliss Company, Brooklyn, N. Y., have contracted for the erection of a shop 200 x 129 feet. The building is located at Jay, Plymouth and Water streets, Brooklyn, N. Y., and will be of steel construction faced with brick. It will be one story, with mezzanine gallery for machinery. Two 40 ton Shaw cranes with an 80 foot span and one 15 ton Shaw crane with a 41 foot span will be installed. The shop will have 44 feet head room under the roof trusses and over the erecting pits the cranes will have a head room of 44 feet. Contracts for the entire building operations and machinery equipment have been signed.

The U. S. Reduction Company, Chicago, Ill., report that they are erecting a building at our works, East Chicago, Indiana, 32 x 120 x 16 feet high, to be used exclusively as a white metal department for the handling of white metals and manufacture of babbitts and solders. They have installed in this building the latest improved machinery and apparatus for the manufacture and treating of babbitts, solder, etc. They have also found their warehouse facilities for receiving incoming shipments too small for their needs and shall erect a new warehouse 32 x 175 feet long. Both buildings will be situated on their private railway switches and will be built even with platform to facilitate unloading and handling of incoming cars.

The Department of Public Safety, Philadelphia, Pa., will hold a National Fire Prevention Conference at Philadelphia, Pa., from October 13 to 18 inclusive. This convention will be in the nature of a clearing house where the sum total of knowledge for various communities may be made more effective and will provide a meeting ground where American States and municipalities can take counsel together and proceed along a uniform campaign to reduce fire waste and the cost of insurance nationally. The fire prevention commission consists of Powell Evans, chairman; Walter F. Ballinger, D. Knickerbocker Boyd, William C. Haddock, Robert S. Perry, Charles A. Hexamer, James Collins Jones, R. H. Newbern, and Jesse D. Burks.

The Stearns Lumber Company, one of Dorchester, Mass., oldest and largest industrial enterprises has been established over sixty-five years. The plant is equipped with the most modern mill equipment for the manufacture of lumber and other building supplies that is possible to have. From 250 to 300 hands are given steady employment while from 30 to 40 auto trucks are required for delivery to freight yards and the trade in general. The Stearns Lumber Company were the first to introduce southern woods into the New England market, thus being pioneers in founding this great branch of the lumber industry in this part of the country. It is entirely due to the untiring efforts of this company that Florida cypress has become known in New England. The firm at present is composed of Fred M. Stearns, president; E. S. Tenney, manager and Henry B. Barham, treasurer. Mr. Stearns being the son of the founder of the mills, A. T. Stearns. The firm also has an office and exhibit at 166 Devonshire street, and a salesroom at 1 Sudbury street, Boston, Mass.

INTERNATIONAL NICKEL COMPANY

The International Nickel Company in a statement just issued shows that the company's affairs are in better condition at present than at any time in the eleven years of its existence. The gross income of the year was about $7,000,000, an increase of $2,000,000 over 1911. The earnings on common stock amounted to 11.7 per cent., which includes the increase of stock from $11,600,000 to $38,031,000 which took effect last September. Without considering this stock increase the earnings amounted to 38 per cent. as compared with 28.9 in 1911.

IMPORTANT METAL CONTRACT.

Paul S. Reeves & Company, Philadelphia, Pa., have just been awarded by the Commissioners of the Board of Water Supply, New York City, Contract No. 70, for finished bronze valves aggregating 680,000 pounds of bronze, steel and iron; of this tonnage 600,000 pounds is bronze, constituting the largest order for bronze castings ever placed by individual, corporation, city or national government. The metal to be used is Reeves' Manganese Bronze, and this company, by the way, was the second company in the United States to manufacture this article, and its many government and commercial orders attest its superior quality.

The time scheduled in which to deliver this work is 72 weeks, but the Reeves company has scheduled the layout in their foundry on a 52 week basis, and this without curtailing or interfering with their regular line of work. This has been made possible by the policy adopted by the company the first of the year to install improved facilities in its several departments. The molding department includes a re-arranged and enlarged core oven which will add more floor room, new floors, flask storage, new core room, compressed air, pneumatic rammers, and a 15 ton electric traveler. These improvements are now under way, but will be pushed with added vigor owing to the award of this contract of which they may justly feel proud, and on which the METAL INDUSTRY congratulates them.

AMERICAN BRASS COMPANY DEVELOPMENTS.

The American Brass Company, of Waterbury, Conn., are now putting forward a plan for the improvement of the facilities of this gigantic organization. Prominent among the more recent developments is the purchase of a large strip of land on the west side of the Housatonic River, between the Washington bridge and the Housatonic railroad bridge at Stratford, Conn. This property consists of twelve acres of ground and will be used by the company for the development of a coaling station from which the coal will be distributed to the various plants operated by the corporation.

Another development is the extension of the plan for the use of electricity in running various plants. At the present time this is particularly true of the plant of the company at Ansonia, Conn., where permission has been granted by the Board of Aldermen of the city to the Ansonia Brass & Copper Company to lay conduits through the main streets. Connecting wires between the two conduits are to run along the river bank on poles and thus the various plants will be connected.

The new office building which the American Brass Company is building at Waterbury, Conn., is rapidly nearing completion, but it is said that it will be some little time before the building is ready for occupancy.

A SUCCESSFUL BRASS SHOP.

One of Connecticut's thriving concerns is the H. E. Rainaud Company, of Meriden. A little over five years ago Henry Rainaud began his business career as a manufacturer of portable and fixture shades. He first occupied the basement of the old Universalist church on Liberty street, but stayed there only a short time. Success attended his efforts from the very beginning and in a year's time the business had grown to such proportions that he found it necessary to seek larger quarters, moving to the present building on West Main street. Recently papers were filed with the Secretary of State Philips, of Hartford, for the incorporation of this company.

corporators are Henry E. Rainaud, William Rainaud and Rosalie Rainaud. The concern has a capital stock of $50,000 all of which is paid in.

The officers of the company are Henry Rainaud, president, and William Rainaud, treasurer. They now employ about forty hands but with their present large quarters and increased capital it is safe to predict that the time is not far distant when they will have to increase their force. No small part of the success achieved by this company is due to the activity and business ability of their president.

BUSINESS TROUBLES

Thomas W. Pangborn Company, Hagerstown, Md., have issued a statement signed by Thos. W. Pangborn, president and treasurer, in which announcement is made of the filing of a voluntary petition in bankruptcy July 28 and Frederick W. Stelle, of New York, was appointed receiver. The first meeting of creditors will be held at the office of William Allen, Referee in bankruptcy, No. 67 Wall street, New York, on August 20, 1913, at 2 o'clock in the afternoon, at which time creditors may attend, prove their claims, appoint a trustee, examine the bankrupt, and transact such other business as may be proper.

The Detroit Foundry Supply Company, Detroit, Mich., has been placed in the hands of a receiver and the Detroit Trust Company was, by order of the Wayne County Circuit Court, appointed as such Receiver on July 16, 1913. This appointment was made on account of a petition filed by a majority of the Board of Directors of the company for the purpose of conserving the assets in the interest of both creditors and stockholders. The Receiver, by Ralph Stone, vice-president, announces that the order of the court permits them to continue the business and this will be decided upon after an inventory and appraisal has been taken and a report made at a later date to the creditors just what the assets and liabilities are.

A petition in bankruptcy has been filed against the American Voltite Company, manufacturer of electroplating and polishing powders, 75 Grand street, by Crisp, Randall & Crisp, attorneys for these creditors: United States and Mexican Trust Company, $39,184; Herbert A. M. Mosse of North Arlington, N. J., $448, and Holmes C. Walton, $348. Judge Mayer appointed E. C. Gude receiver, bond $5,000. The liabilities are $50,000, and assets $8,000, in materials, manufactured product, plant equipment, office furniture, and accounts. Also in the assets is a secret process for the manufacture of gold, silver, and nickel polishes, and the judge was informed that it was very desirable that the secret process should not be made public. Voltite was brought to the United States by the late Arthur T. Firth, the inventor, from Australia, and it was through his untiring efforts that the American Voltite Company was formed, but this company had no connection with Voltite Company, Ltd., of New Zealand.

FIRES

Fire partly destroyed the plant of the Backus & Leeser Company, manufacturers of electro-plating materials, 410-412 West Thirteenth street, New York. An inventory is being taken in order to make an adjustment with the Insurance Company.

CHANGE IN FIRM NAME

The Youngstown Bronze and Iron Company of Youngstown, Ohio, has filed papers with the Secretary of State changing its name to the Mahoning Foundry Company.

REMOVAL

The Manufacturers Brush Company, announce that after August 1 they will occupy their new plant at 1956-58 West Forty-fifth street, Cleveland, Ohio, which will be one of the most modern of its kind in the country and will enable them to give the orders better attention.

Adolph Neubeck, Inc., importers of Dr. Fredrick Neubeck's electro-plating preparations, formerly of 126 Fifth avenue, New York, announce their removal to Buffalo, N. Y., where they will be located at 150-154 Ellicott street.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

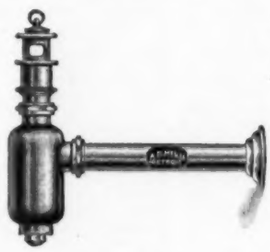
A new firm under the name of Vincent & McCowan has been organized at Glens Falls, N. Y., and is now in operation. The firm manufactures brass print rolls to be used by wall paper concerns in printing background for paper. The two progressive young men have obtained a patent on their new product and have purchased a machine for turning out the work, which is operated in the building occupied by Frank W. Saugert as a print office at 53 John street.

PRINTED MATTER

Metal Price List.—The Rome Brass & Copper Company, Rome, N. Y., have just issued their latest general price list No. 68, which gives the current prices of all extras over base prices on the extensive line of brass and copper goods manufactured by this concern. The book is bound in leather, is of loose leaf construction and contains fifty-five pages of printed matter. The loose leaf construction of the catalog is particularly convenient, as any changes in prices can be readily inserted from time to time and thus keep the necessary information right at hand for ready reference.

The Foundry and Machine Exhibition.—The Foundry and Machine Exhibition Company, by C. E. Hoyt, secretary, Chicago, Ill., have issued a very handsome calendar printed in colors with a reproduction of a foundry scene embossed in gold. The calendar is 8 by 16 inches in size and contains an interesting announcement relating to the annual exhibition to be held in Chicago, Ill., October 10 to 17. A very clever feature of the calendar is that the month of October is blocked out in red emphasizing the dates of the exhibition and urgent invitation is given to everyone, whether manufacturer or employee to attend the exhibition which is to be held in conjunction with the conventions of the various foundry and metal associations.

Wastes and Traps.—The A. D. Manufacturing Company, of Detroit, Mich., manufacturers of wastes and traps, are calling the attention of the trade to their improved deep seal cast brass trap. Their No. 233, with P. O. plug and clean-out or trap screw, is a popular style and herewith illustrated. The critical buyer of traps will find in these A. D. deep seal traps a great improvement, as the body of the trap is cast in a single piece without screwed joints to become loosened and cause leakage. All A. D. stock is made heavy from new metal, free from sand holes and is guaranteed by the maker to be first class in every respect and to give satisfaction. This company makes a large line of wastes and traps, all of which are strictly sanitary and indorsed by the leading sanitary engineers and inspectors everywhere. Their catalog is free and will be sent upon request.



CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REVIEW

NEW YORK, August 4.

COPPER.

It is interesting to note that the month of July has marked the turning point in the copper market as well as the turning point in the pig-iron market.

The copper market opened at around 14¾ for electrolytic, home consumers did not seem interested, Europe was not a buyer and prices gradually sagged off to 14¼ and possibly an ⅛ lower; this was towards the middle of the month and Europe began buying at the low level. It is a noteworthy fact, and we have several times alluded to it in these market reviews, that Europe invariably gets in at the bottom of the copper market. During the present movement Europe had secured several million pounds before the home consumers started to buy and prices were then well up to 14¾ when this home movement started. The copper market has been quite active towards the end of July and with the strike at the Lake mines and the strong statistical position of the copper market prices were easily forced up to 15¼ cents per pound or just about one cent above the low price ruling earlier in the month.

The exports were fairly good—29,096 tons against 27,815 tons in June and 26,761 in July last year. The foreign statistics show a decrease of 2,530 tons for the month and the European stocks of copper today are 35,630 tons against 50,580 tons a year ago.

Later: The market is active and higher, prices are: Lake and Electrolytic 15¾, and Casting 15½.

TIN.

The speculative tin market in London suffered from the tight money market abroad and prices broke violently, following the smash in prices in June. From around 41½ at the opening values declined to close to 39 cents and then reacted sharply towards the end of the month and closed 40¼ cents. The London market seems to be in better shape and with a good consuming demand in America prices may firm up. Market today 5-10 ton lots around 40¾ cents.

LEAD.

The lead market during the month has followed the dictum of the trust. On May 5 the lead trust put the price of lead down 15 points to 4.35 and on July 29 the trust put the price up 15 points to 4.50, New York basis, and that is where it is today, 4.50 New York and 4.35 East St. Louis.

Any decline in duty will hardly affect the home market as the foreign market will naturally advance in accordance with an understood arrangement.

SPELTER.

The spelter market has worked up about ¼ cent per pound—from around 5.35 New York basis to 5.60 at the close and the market looks fairly strong.

The proposed change in the duty may prevent the unhealthy manipulation of the market that has been a bad feature of the spelter market during the last year or so, and it will hardly be possible to work the market up to nearly 7 cents per pound without bringing in some foreign spelter.

The market today is 5.60 New York, carload lots, and 5.45 East St. Louis. Sheet zinc has been advanced from 7.00 in June to 7.50 at the smelter on July 30.

ALUMINUM.

The aluminum market has been more or less irregular and unsettled and prices have fluctuated from around 23½ at the opening up to 24 cents, the highest, and market closes today at 23¼ cents for 98.99 per cent. ingots.

ANTIMONY.

The antimony market has not changed very much. Cookson's is around 8½, Hallett's 8 to 8⅛, and Hungarian grade at 7½ to 7¾ cents.

SILVER.

The silver market has been very steady and shows an advance for the month of 1¼ cents from 58⅛ at the opening to 59⅜ at the close.

QUICKSILVER.

There has been no change in the wholesale price of quicksilver; $39 a flask for lots of 100 flasks and jobbing lots from $40 to $41 per flask.

PLATINUM.

Prices are about the same as a month ago. Hard $51 and ordinary refined at $46 an ounce.

SHEET METALS.

Sheet copper is about the same as a month ago—more or less nominal at 20 cent base, copper wire is firmer at 16 to 16¼ cent base and brass prices are likely to be advanced. High sheet brass is quotable today at 14¾ base.

OLD METALS.

With the firm markets for copper, lead, spelter and tin, prices for all old metals are rather better, but trading is very slow and it is difficult to obtain the advances of the ingot metals.

August 8.—The American Brass Company has today withdrawn all prices. Looks like 16 cents for copper.—J. J. A.

JULY MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	15.25	14.50	14.75
Electrolytic	15.25	14.25	14.60
Casting	15.00	14.00	14.50
TIN	41.70	39.25	40.40
LEAD	4.50	4.35	4.40
SPELTER	5.60	5.35	5.50
ANTIMONY (Hallett's)	8.15	8.00	8.10
SILVER	59⅜	58⅛	58.72

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)
Combined reports of July 9 and August 8, 1913.

		Pounds.
Stocks of marketable copper of all kinds on hand at all points in the United States, June 1, 1913		67,564,225
Production of marketable copper in the United States from all domestic and foreign sources during June and July, 1913		259,935,455
	Pounds.	
June	121,860,853	
July	138,074,602	
		327,499,680
Deliveries:		
For domestic consumption	127,356,763	
For export	146,547,972	
	Pounds.	
June	136,520,472	
July	137,384,263	
		273,904,735
Stocks of marketable copper of all kinds on hand at all points in the United States, August 1, 1913		53,594,945
Stocks decreased during the month of June		14,659,619
Stocks increased during month of July		690,339

WATERBURY AVERAGE

The average price of Lake Copper per pound as determined monthly at Waterbury, Conn.

1912—Average for year, 16.70. 1913—January, 17; February, 15.50; March, 15⅛; April, 15.75; May, 15⅞; June, 15⅜; July, 14¾.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

Metal Prices, August 11, 1913

METAL PRICES.

	Price per lb. Cents.
COPPER—PIG AND INGOT AND OLD COPPER. Duty Free. Manufactured 2½c. per lb.	
Lake, carload lots	15.25
Electrolytic, carload lots	15.25
Castings, carload lots	15.00
TIN—Duty Free.	
Straits of Malacca, carload lots	40.50
LEAD—Duty Pig, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.50
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western, carload lots	5.60
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots, f. o. b. factory	26.00
100 lb. lots, f. o. b. factory	25.00
Ton lots, f. o. b. factory	23.50
ANTIMONY—Duty 1½c. per lb.	
Cookson's cask lots, nominal	8.50
Hallett's cask lots	8.15
Hungarian grade	7.75
NICKEL—Duty Ingot, 6c. per lb. Sheet, strip and wire 35 per cent. ad valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	40 to .45
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL—Duty 20 per cent	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25 per cent. ad valorem (100 lb. lots)	$1.50
BISMUTH—Duty free	$2.00
CADMIUM—Duty free	.90
CHROMIUM METAL—Duty 25 per cent. ad valorem	.98
QUICKSILVER—Duty 7c. per lb	.55
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	46.00
SILVER—Government Assay Bars—Duty free	.59¼

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% ..... according to quantity	27 to 32
Silicon Copper, 20% ..... " "	34 to 36
Silicon Copper, 30% guaranteed " "	36 to 38
Phosphor Copper, guaranteed 15% ..... " "	24 to 28
Phosphor Copper, guaranteed 10% ..... " "	22 to 26
Manganese Copper, 25% ..... " "	25 to 29
Phosphor Tin, guaranteed 5% " "	61 to 63
Phosphor Tin, no guarantee.. " "	47 to 50
Brass Ingot, Yellow ..... " "	10½ to 11½
Brass Ingot, Red ..... " "	13½ to 15
Bronze Ingot ..... " "	14¼ to 14¾
Manganese Bronze ..... " "	18½ to 20
Phosphor Bronze ..... " "	20 to 23
Casting Aluminum Alloys .... " "	22 to 25
PHOSPHORUS—Duty 18c. per lb. According to quantity	30 to 35

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
13.00 to 13.25	Heavy Cut Copper	14.25 to 14.50
12.75 to 13.00	Copper Wire	14.00 to 14.25
11.50 to 11.75	Light Copper	13.25 to 13.50
11.50 to 11.75	Heavy Mach. Comp.	13.25 to 13.50
7.75 to 8.00	Heavy Brass	9.25 to 9,50
7.00 to 7.25	Light Brass	8.00 to 8.25
7.25 to 7.50	No. 1 Yellow Brass Turnings	8.75 to 9.00
10.50 to 11.00	No. 1 Comp. Turnings	11.50 to 12.00
4.00 to ——	Heavy Lead	—— to 4.25
3.75 to ——	Zinc Scrap	4.00 to 4.25
6.00 to 7.00	Scrap Aluminum Turnings	8.00 to 9.00
13.00 to 14.00	Scrap Aluminum, cast, alloyed	15.00 to 16.00
15.00 to 16.00	Scrap Aluminum, sheet (new)	17.00 to 18.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	23.00 to 26.00

PRICES OF SHEET COPPER.

BASE PRICE, 21 Cents per Lb. Net.

SIZE OF SHEETS. Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for **Circles and Segments** to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC—Duty, sheet, 1⅝c. per lb.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill	7.50 less 8%
Casks, jobbers' prices	8c.
Open casks, jobbers' prices	8½c.

Metal Prices, August 11, 1913

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect August 8th, 1913, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15	$0.16⅞	$0.18⅝
Wire	.14¾	.16⅞	.18⅝
Rod	.14¾	.17⅝	.19⅝
Brazed tubing	.19½	—	.23½
Open seam tubing	.19½	—	.23½
Angles and channels, plain	.19½	—	.23½

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 9.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.16¼	$0.18⅛	$0.19⅝
Wire	.16	.18⅛	.19⅝
Rod	.16	.18⅞	.20⅝
Brazed tubing	.20¾	—	.24⅝
Open seam tubing	.20¾	—	.24⅝
Angles and channels, plain	.20¾	—	.24⅝

Net extras as shown in American Brass Manufacturers' Price List No. 9.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	¼c.	per lb. net advance
" —Best spring, drawing and spinning brass	1¼c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

17c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	21½c.	per lb. base
100 lbs. to 300 lbs. in one order	22c.	" " "
Less than 100 lbs. in one order	23½c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 20c. per lb.
Seamless Copper Tubing, 23c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	28	27	22	21	20	20	20	20	20	20	20	21	22	24	26	27

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1½ inch	25	27
1⅔ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 50 and 5%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	18c.	net base
Munts or Yellow Metal Sheathing (14" x 48")	15½c.	" "
" " " Rectangular sheets other than Sheathing	18c.	" "
" " " Rod	15½c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 24⅞c. net.
German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.
Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 28 B. S. Gauge, 2c. above price of pig tin in same quantity.
Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	500 lbs.	50 lbs.	Less than 50 lbs.
20 and heavier	3-30	33c.	34c.	36c.	38c.
	3-30	34c.	35c.	37c.	39c.
21 to 24 inclusive	30-48	36c.	37c.	39c.	41c.
	48-60	39c.	40c.	42c.	44c.
25 and 26	3-30	35c.	36c.	38c.	40c.
	30-48	37c.	38c.	40c.	42c.
27	3-30	36c.	37c.	39c.	41c.
	30-48	39c.	40c.	42c.	44c.
28	3-30	37c.	38c.	40c.	42c.
	30-48	40c.	41c.	43c.	45c.
29	3-30	38c.	39c.	41c.	43c.
	30-48	42c.	43c.	45c.	47c.
30	3-30	39c.	40c.	42c.	44c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. Charges made for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 24 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	19	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	22	22	20	20	20	20	26	30	36
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	28	23	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb.	33	33½	33½	34	34½	35	35½	36	37	38	39	44	47

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to No.	19,	B. & S.	Gauge,	inclusive $0.60
6	"	"	19,	"	"	" .70
9	"	"	19,	"	"	" .85
12	"	"	19,	"	"	" 1.00
15	"	"	19,	"	"	" 1.15
16	"	"	19,	"	"	" 1.20
18	"	"	19,	"	"	" 1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.
For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.
Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.